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Getting the Most from the Index

THIS is essentially a subject index, not an index of titles, and articles treating a number of different subjects are listed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, city, state or nation. Entries about an electric railway are under the name of the city in which the main office of the company is located.

In the subject index, the alphabetical method is followed. If there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. The headings which appear in the index itself are in small type under the general classifications. The main headings in capitals below do not appear in the index.

As an example of how to use the index, if a reader wishes to locate an article on special trackwork he obviously would look in the list below at the general subject "Track." Under this caption, only "Special trackwork" could apply to the article in question.

The large number of articles brought out on the monthly maintenance data sheets, together with the increasing number of maintenance notes in other issues has resulted in the substitution of three keywords, for indexing items formerly appearing under "Repair shop practice": (1) Maintenance data, under which all articles appearing on the monthly maintenance data sheets are grouped; (2) Maintenance equipment, with classified subheads, under which all articles in the weekly department "New Equipment" are included, and (3) Maintenance practice, also with classified subheads, under which all articles in the weekly department "Maintenance Notes," as well as the articles on the data sheets, are inserted. The heading "Repair Shops and Equipment" has been reserved for general articles on the design of repair shops and their equipment. Otherwise the plan used for many years in the preparation of this index has been followed.

In addition to the groups of articles covered by these headings, papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed.

Signed articles also are indexed by the name of the author. When the name of the author is known to the reader this provides the simplest method of locating any article.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION
Accident claim department
Accident prevention
Accidents (including wrecks)
Insurance, Fire
Safety work
Storm and fire damage

ELECTRIC CARS AND SERVICE CARS
Cars (including car design)
Locomotives
Service and tower trucks
Trackless trolley

CAR EQUIPMENT
Bearings
Brakes and compressors
Doors, car
Electrical equipment for cars (except motors)
Gears and pinions
Heaters, electric
Lighting and lighting fixtures
Motors, Electric
Seats
Trucks
Wheels and axles

EMPLOYEES
Education
Employees
Insurance and pensions
Labor
Strikes and arbitrations
Wage decreases
Wage increases
Wages and working agreements

FARES
Fare collection (including apparatus)
Fare decreases
Fare increases
Fares
Traffic investigations
Traffic stimulation

FINANCIAL, LEGAL AND STATISTICS
Accounting
Appraisal of railway property
Blanks and forms
Discontinuance of lines
Financial (methods of financing)
Financial reports
Franchises
Insurance, Fire
Insurance and pensions
Legal
Legislation for railways
Market conditions
Operating records and costs
Public service and regulative commissions
Statistics
Taxes

HEAVY ELECTRIC TRACTION
Heavy electric traction (general)
Locomotives

MAINTENANCE OF EQUIPMENT
Car cleaning
Lubrication
Maintenance data
Maintenance equipment
Maintenance practice
Maintenance tools, Suggestions for
Motor buses, Operating practice
Painting
Repair shops and equipment
Stores
Tests of materials and equipment
Welding

MOTOR BUSES
Motor buses, design
Motor buses, gas-electric
Motor buses, installations
Motor buses, jitney competition
Motor buses, Operating practice
Motor buses, regulation

POWER
Energy checking devices
Energy consumption
Fuels

POWER—Continued
Overhead contact system
Power distribution
Power generation
Power stations and equipment
Power transmission
Substations and equipment

STRUCTURES
Bridges
Carhouses and storage yards
Loading platforms
Power stations and equipment
Repair shops and equipment
Substations and equipment
Terminals and waiting stations

TRACK
Pavements
Rail joints and bonds
Rails
Special trackwork
Ties
Track construction
Track maintenance

TRAFFIC AND TRANSPORTATION
Advertising
Dispatching
Freight and express
Interurban railways
Merchandising transportation
Parking of cars
Publicity
Public, Relations with
Rapid transit (elevated and subway)
Schedules and timetables
Signals
Street traffic congestion
Traffic investigations
Traffic regulation
Traffic stimulation
Transportation, Metropolitan (general studies)

MISCELLANEOUS
European practice
Management
Noise reduction
Railway construction proposed
Railways (general)
Snow and ice removal
Standardization
Wood preservation

INDEX TO VOLUME 73

PAGES BY ISSUES

	Pages
January 5	1 to 40
January 12	41 to 106
January 19	107 to 148
January 26	149 to 188
February 2	189 to 228
February 9	229 to 268
February 16	269 to 308
February 23	309 to 346
March 2	347 to 382
March 9	383 to 418
March 16	419 to 460
March 23	461 to 498
April	499 to 566
May	567 to 626
June	627 to 692
July	693 to 754
August	755 to 818
September	819 to 874
Convention Number	875 to 946
October	947 to 1028
November	1029 to 1090
December	1091 to 1152

A

Accident claim department:
—Ambulance chasing:
Checked in Youngstown [Wood], *999.
Comments on, 231.
Efforts to correct in New York [Mayo], *998.

Accident prevention:
—Akron, Ohio:
Superintendent of accident prevention, 356.
—Asheville, N. C.:
Safety record, 219.
—Chicago, Ill.:
Rapid transit safety award.
—Chicago, North Shore & Milwaukee Railroad:
Grade crossing, *356.
—El Paso, Tex.:
Brady contest, 201.
—Gary, Ind.:
Accident prevention vacations, 490.
—Louisville, Ky.:
Grade crossing elimination, 124.
—Grand Rapids, Mich.:
Drivers' creed, 408.
—Louisville, Ky.:
Improved record, 291.
—Newark, N. J.:
Bonuses paid, 30.
—New York City:
Brooklyn City R.R. band in safety work, 23.
—New York City:
Interlocking doors and power, 191.
—Pittsburgh, Pa.:
Medals for safe driving, 614.
—Portland, Ore.:
Portland Electric Power Co. accident record, 1078.
—Safety for employees, Comments on, 1092.
—St. Louis, Mo.:
Courteous Drivers Club, 559.
—St. Louis, Mo.:
"Safe a Life" campaign, 744.
—San Diego, Cal.:
Locomotive striped [Tipton], *710.
—Seattle, Wash:
Safety tunnels proposed, 407.
—Springfield, Ohio:
Safety work, 559.
—Tampa, Fla.:
Reduces accidents, *161.
—Washington, D. C.:
Trainmen's meetings, 366.
—Wilmington, N. C.:
Safety bonus, 258.
—Youngstown, Ohio:
Penn-Ohio record, 299.

Accidents (Including wrecks):
—Baltimore, Md.:
Public Service Commission investigates bus accident, 1082.
—Cleveland, Ohio:
Lake shore electric collision, 335.
—Detroit, Mich.:
Safety zone accidents, *335.
—New York City:
Fire in Hudson tube, 333.
—St. Louis Public Service Co.:
Broken fan on bus does damage, 744.

Accounting:
—Depreciation accounting:
A major problem [Conway], *994.

Advertising (See also Publicity):
—Allentown, Pa.:
Lehigh Valley Transit uses effective advertising, 29.
—Atlanta, Ga.:
Georgia Power Co. newspaper advertising, *823.
—Biddeford, Me.:
Biddeford & Maine advertising, *426.
—Bok award, 188.
—Boston, Mass.:
Boston Elevated offers advantages to motorists, *1104.
—Cincinnati, Ohio:
Newspaper advertising, *217.
—Denver, Colo.:
Newspaper advertising, 219.
—European practice:
Car advertising, *482.
—Importance of Good Advertising:
Comments on, 462.
—Jacksonville Traction Co.:
Wins Stone & Webster, Inc., prize, 681.
—London, England:
Newspaper advertising, *201.
—Massachusetts Lines:
Newspaper advertising, 401.
—Merchandising transportation:
General use of advertising, *427.
—Newspapers:
Georgia Power Company's campaign, comments on, 819.
—New York City:
Richmond Railways advertise, 336.
—Readers of periodicals:
Compared with car riders, 666.
—St. Louis Public Service Co.:
Newspaper advertising, 99.
—Salt Lake City, Utah:
Newspaper advertising, 407.
—Schenectady, N. Y.:
Schenectady publishes "Riders' Guide," 743.
—Worcester, Mass.:
Newspaper advertising, 450.

Akron, Ohio:
—Northern Ohio Power & Light Co.:
Bus sustitution sought, 375.
City asks for competitive bids to furnish transportation, 333.
Floor in storeroom, *116.
Improvements, 306.
New bus lines, 558.
New franchise sought, 256.
Rerouting in Cuyhoga Falls, 743.
Safety work, 356.
To abandon Massillon service, 560.

Alabama Power Co. (See Birmingham, Ala.):

Albany, N. Y.:
—Albany Transit Co.:
Additional routes asked for, 300.
—Eastern New York Utilities Corporation:
Seeks to liquidate, 1083.
—United Traction Co.:
United Traction Co. purchased, 36.
Asks bus substitution in Troy, 744.
Changes on board, 685.
New bus service trial, 452.

Albany, Ore.:
—Oregon Electric Ry.:
New franchise, 613.

Allentown, Pa.:
—Allentown & Reading Traction Co.:
Bus substitution, 808.
—Lehigh Valley Transit Co.:
Advertising trolley transportation, 29.

Alexandria, Va.:
—Mt. Vernon, Alexandria & Washington Electric Ry.:
Paving of tracks, 557.

Alliance, Ohio:
—Stark Electric Ry.:
Alliance-Canton bus controversy, 808.
New magazine, 680.
Passengers 1928, 143.
—Alliance Power Co.:
Changes in management, 144.
—Utilities Service Co.:
Expansion, 182.

American Electric Railway Accountants' Association:
—Annual convention:
Depreciation accounting study, comments on, 949.
Reports, addresses and discussion, *993.
Review of reports presented, *1012.

American Electric Railway Association:
—Bulletins, 450.
—Mid-Western and Southwestern sections:
Industry fundamentals discussed, 582.
—National motor bus division met at Buffalo, 768.
—Operating statistics for 1928, *43.
—Regional conference:
San Francisco meeting of executives, 441.
Boston meeting, 767.
—Traffic, fare and wage figures, 412.
—Wages and fares statistics, 302.
—Washington, D. C.:
Office of A.E.R.A. reorganized, 1122.

American Electric Railway Association (Continued):
—Annual convention:
48th annual, comments on, 1030.
Convention golf at Atlantic City, 943.
Convention plans, 556.
Many innovations in car design, *1037.
Program announced for convention at Atlantic City, 857.
Addresses, *958.
Address of managing director [Gordon], *955.
Advisory Council meeting and addresses, *972.
American and affiliated associations, *950.
American Association, getting down to fundamentals, 953.
Arrangement of programs, comments on, 949.
Canadian Electric Railway Ass'n holds meeting, 971.
Equipment and apparatus shown, *1013.
Executives review A.E.R.A. committee work, *1000.
Foremen's training conference, 971.
Luncheon conferences, *969.
New ideas, comments on, 947.
New officers elected, *957.
President's address [Barnes], *951.
Registration, 971.
Speakers on needs of industry, comments on, 948.
—Committee activities:
Committee on employee:
Employee education, 408.
Executive committee, 211, 658.
San Francisco for 1930 convention, 768.
Exhibit committee, 187, 345, 690.
—New presidents:

American Electric Railway Claims Association:
—Annual convention:
Reports, addresses and discussion, *997.
Review of reports presented, *1012.

American Electric Railway Engineering Association:
—Annual convention:
Reports, addresses and discussions, *983.
Review of reports presented, *1004.
—Committee activities:
Special trackwork specifications approved, 318.
Committee on rolling stock, car illumination, 338.
Meetings, 408, 449.
Car design, 338.

American Electric Railway Transportation & Traffic Association:
—Annual convention:
Address, competition and rate making [Cabot], *988.
Comments on, 948.
Reports, addresses and discussions, *990.
Review of reports presented, *1009.
—Committee activities:
Movement of vehicles discussed, 407.
—Regional meeting in Boston, 767.
Executive committee meeting, 658.
Exhibit committee, 345, 690.
Committee on rolling stock, meeting, 449.

American Federation of Labor:
—New Orleans strike:
Public statement, 863.

American Institute of Electrical Engineers:
—Meeting at Swampscott, Mass., 787.

American Railway Association:
—Motor transport division:
Railroads discuss motor bus, 405.

American Road Builders' Association:
—Traffic problem to be studied, 863.

American Society of Mechanical Engineers:
—Tools:
Standards adopted, 227.

American Standards Association:
—American Electric Railway Association:
Co-operation, comments on, 821.
—American standards for bolts and nuts, 615.

American Superpower Corporation:
—Announcement, 100.

Anderson, Ind.:
—Union Traction Co.:
Hearing on bond sales, 944.

Anthony N. Brady safety award:
—Award for 1927, *5, 97.
Comments on, 3.
—El Paso, Tex.:
El Paso Electric to compete, 946.
—Wilming on, N. C.:
Wins prize second time, 249.

Appraisal of railway property:
—AERA Bulletin, 450.
—Chicago, Ill.:
Chicago Rapid Transit valuation, 944.
—Louisville, Ky.:
Appraisal presented, 453.
—Indiana:
Public Service Commission recognizes O'Fallon ruling, 867.
—San Francisco, Cal.:
Market St. Railway valuation, 741.
—Washington, D. C.:
Senate action, 103.

Argentina:
—Electric Bond & Share Co.:
Purchase Argentine company, 338.

Arkansas Power & Light Co. (See Little Rock, Ark.)

Asheville, N. C.:
—Carolina Power & Light Co.:
Accident prevention, 219.

Association of Electric Railway Equipment Men, Middle Atlantic States:
—Meeting date changed, 806.

Athol, Mass.:
—Athol & Orange Transportation Area:
Operating record, 377.

Atlanta, Ga.:
—Georgia Power Co.:
Bus service in Rome, 559.
Fare controversy at Decatur, 945.
Fortieth anniversary of trolley in Atlanta, 1025.
Free shopping tickets, 406.
Improvements large, 266.
Making gear cases tight, *549.
Newspaper advertising, *823.
Organization important [McAloney], 832.
Rerouting of cars, 615.
Sells stock through employees, 103.
Supreme court to test Decatur 5-cent fare ruling, 1077.
Wages discussed, 298.

Atlantic City, N. J.:
—Atlantic & Suburban Ry.:
To abandon, 560.

Auburn, N. Y.:
—Auburn & Syracuse R.R.:
To abandon, 493.

Augusta, Ga.:
—Augusta-Aiken Railway & Electric Corporation:
Employees' service badges, 392.
—Georgia Power Co.:
Fare increase asked, 451.

Aurora, Ill.:
—Chicago, Aurora & Elgin R.R.:
Commutation tickets, 554.
Fare increase attacked, 373.

Austria:
—Electrification, *350.
—Vienna:
4 day pass, 401.

B

Ballston, N. Y.:
—Kaydeross R.R.:
Commission orders repairs, 743.

Baltimore, Md.:
—Bus taxes, 221.
—Parking ordinance, 557.
—Public Service Commission:
Investigation of bus accidents, 1082.
—United Railways & Electric Co.:
"Baltimore products week," 614.
Bus grant opposed, 808.
Cooling system for bus engines [Hughes], *661.
De Luxe bus service, 808, 865.
Fare case, 139, 553, 1080.
Improvement in serivce, 864.
Lucius S. Storrs goes to Baltimore, Comments on, 501.
New substation, 458.
Operating statement, 103, 376, 809.
Parking:
Serious menace, 371.
Restrictions speed traffic, 616.
Park taxes increase, 807.
Paving of tracks, help asked, 557.
Railway representatives on safety council, 555.
Securities inactive, 181.
Traffic problem solution, 190.
Trolley wire breaks prevented [Trautman], *506.
Tunnel suggested for Baltimore, 177.
Unusual financing, Comments on, 1029.
—Washington, Baltimore & Annapolis R.R.:
New trailers in service, 945.
Segregation likely, 340.

Bamberger Electric Ry. (See Salt Lake City, Utah)

Bearings:
—Babbitting, 114.
Effect on lubrication [Kauffman].
—New York City:
Roller bearings on B-M-T, 307.

Beaumont, Texas:
—Eastern Texas Electric Co.:
Straightening front end channel irons [Pressler], *849.

Beaver Valley Traction Co. (See New Brighton, Pa.)

Beech Grove, Ind.:
—Beech Grove Traction Co.:
Petition to buy competitor, 374.

Berlin, Germany (See Germany)

Bethlehem, Pa.:
—Bethlehem Transit Co.
Bus Substitution, 180.

Biddeford, Me.:
—Biddeford & Saco Ry.:
Advertising, *426.

Binghampton, N. Y.:
—Binghamton Ry.:
Foreclosure, 492.
—Triple Cities Traction Co.:
Color contest, 864.

Birmingham, Ala.:
—Bus Service:
Petitions circulated, 299.

Boise, Idaho:
—Boise & Western R.R.:
Authorized to operate, 945.
—Boise Traction Co.:
Bus competitor ordered off, 1025.

Book reviews:
—Appointments for 1929, by London Underground System, London, England, 106.
—Arc welding—Lincoln prize papers, by Edward P. Hulse, 815.
—Black on recision and cancellation, by Henry C. Black and Hon. Jay M. Lee, 413.
—Boston Elevated Railway co-operation, 1928, by Boston Elevated Railway, Boston, Mass, 263.
—British Electrification Committee, Reports to Ministry of Transport, by His Majesty's Stationery Office, London, 263.
—Budget control—what it does and how it does it, by Ernst & Ernst, 413.
—Capital stock without par value, by John R. Wildman and Welden Powel, 1084.
—Commerce yearbook, 1928, by Department of Commerce, Bureau of Foreign and Domestic Commerce, 413.
—Digest of motor court decisions on motor carrier operations, by John M. Meighan, 106.
—Electrical engineering—alternating currents, by Chester L. Dawes, 263.
—Electric drive practice, by Gordon Fox, 413.
—Frontiers of trade, by Dr. Julius Klein, 1084.
—German railroad calendar, published by Publicity Department of the German Railway System, 1084.
—Handling London underground traffic, by J. P. Thomas, 106.
—Labor management, by Gordon S. Watkins, 413.
—"Mäste und Türme in Stahl," by P. Sturzenegger, 413.
—Methods of compiling statistics of railway accidents, published by World Peace Foundation, 1084.
—Music in Industry, by Kenneth S. Clark, 1084.
—Oxy-Acetylene Welder's handbook, by M. S. Hendricks, 1084.
—Practical railway painting and lacquering, by H. Hengefeld, 562.
—Principles of scientific purchasing by Norman F. Harriman, 263.
—Propaganda—The public mind in the making, by Edward L. Bermays, 106.
—Standards yearbook, 1929, by National Bureau of Standards, George K. Burgess, director, 413.
—The engineering index service, 413.
—The financial post year book of Canadian business, by Canadian *Financial Post*, Toronto, Ont.
—Universal directory of railway officials, published by the Directory Publishing Company, Ltd., London, 1084.

Boston, Mass.:
—Boston elevated bill, opposed by mayor, 409.
—Legislation:
Special bill for Ashmont buses, 683.
—Rapid transit:
Service to Milton, 864.
Speeds of trains, 1060.
—Boston Elevated Ry.:
Car yard at Dorchester, *362.
Bus dimensions, 102.
Clutch brake disk, *130.
Comments on extensions, 189.
Discontinuance of bus line, 683.
Extensions cost $55,000,000, 175.
Extension of lines, 216.
Fare collection experiment, 944.
Governors appointments, 100.
Guide book of Boston El., *861.
Horses replaced by motor vehicles, 15.
New bill before legislature, 370.
Offers advantages to motorists, *1104.
Operating cost for July, 945.
Operating statement, 494, 809.
Public control bill before legislature, 335.
Restores 3 bus lines in Medford, 866.
Riding habit, Comments on, 720.
Test bus fare decrease, 559.
Wage controversy, 217.
—Boston, Worcester & New York Street Ry.:
Bus petition in Worcester denied, 866.
—Eastern Massachusetts Street Ry.:
Board of public trustees, 35.
Bus substitution, 558, 744.
Comments on management policy, 151.
Dividend, 946.
Dollar passes increase riding, *837.
Elects officers, 455.
Financial statement, 377.
Management policy, 174.

Boston, Mass.:
—Eastern Massachusetts Street Ry. (Continued):
Matured bonds, 103.
Operating statement, 560.
Pays common dividend, 492.
Wage agreement, 372.
—Boston & Maine Transportation Co.
Buses in Boston, 260.

Bradford, England:
—Trackless trolley, 33.

Brady Safety Award (See Anthony N. Brady safety award):

Bristol, Pa.:
—Trenton, Bristol & Philadelphia St. Ry.:
Foreclosure, 618.

Britton I. Budd Medal:
—Chicago, Ill.
Award at safety banquet, 450.

Brooklyn City R.R. (See New York City):

Brooklyn-Manhattan Transit Corporation (See New York City):

Buenos Aires, Arg.:
—Subways:
Work being hurried, 682.

Buffalo & Erie Ry. (See Fredonia, N. Y.):

Buffalo, N. Y.:
—International Bus Corp.:
Certificate for bus operation, 180.
—International Ry.:
Accidents decline, 28.
Fare increase report, 370.
Line discontinuance asked, 36.
Mirrors improve pit lighting, *853.
Motor operated garage sweeper, *1135.
New service offered, 299.
Newspaper supports railways, 1140.
One man cars on interurban, 806.
Operating statement, 302.
Rain trough for bus engines, *508.
Repairing car trucks without dismantling *1133.
Sand dryer, *121.
Track construction program, 266.

Burlington, Vt.:
—Burlington Traction Co.:
Stock bought by W. S. Appleyard, 492.
—Business expansion to continue in 1930, 1138.

C

California Electric Railway Association:
—Meeting in Los Angeles, 652.

California, State of:
—Motor vehicle regulations being formulated, 1082.

Canadian Electric Railway Association:
—Meetings at Montreal.
Silver Anniversary, 723.
Annual meeting, 219.
Meeting, 615.
—Statistics compiled show gains in revenue, *1049.

Canadian Electric Railways:
—Car orders placed, 753.
—Canadian properties show gain, Comments on, 1031.

Canton, Ohio:
—Canton Street Car & Bus Co.:
Incorporated to serve Canton, 743.

Car cleaning:
—Vacuum cleaner for seats, *130.

Car design:
—A.E.R.A. Convention shows many innovations, *1037.
—Brazil, S. A.:
Cars by J. G. Brill Co., 625.
—Car and bus design:
Better cars and buses needed [Lambert], *967.
—New [Frey], *157.
—Cars to meet today's demand [Adams], *989.
—Committee on rolling stock:
Car illumination, 338.
—Crystallized opinion needed, 1029.
—Detroit, Mich.:
Light weight car, *786.
—Dresden, Germany:
Articulated car design, 392.
—Experimental cars for Pittsburgh, Comments on, 694.
—Floors [Brett], 482.
Requirements of car flooring [Mallay], c729.
—Indianapolis, Ind.:
Design of Beech Grove car, 459.
—Iowa Electric Ry. Ass'n.:
Equipment improvement topic, 1118.
—J. G. Brill Company:
New catalog:
—Liverpool, England:
Integral truck and motor design, *1105.

Car design (Continued):
—Louisville, Ky.:
Sample cars, Comments on, 629.
—London, Eng.:
Car design improvements, 477.
—London, Eng.:
Improved truck for Metropolitan Electric Tramways, 1127.
—London underground car design, *542.
—New cars:
Affect operating costs [Buck], *583, *653.
—New Truck:
Timken truck with armature shaft brakes, *601.
—New objectives govern design [Faust], *925.
—Philadelphia, Pa.:
Subway car design, *319; Comments on, 310.
—Pittsburgh, Pa.:
Light weight design, *712.
—Requirements of service:
Determine design [Woods], *843.
—San Francisco, Cal.:
Car design, 417.
—Suggestions for improvements, 133.

Car orders (See Car design):
—Car specifications (including orders):
—Standardized cars:
Orders placed, *752.
—Regina, Sask.:
Specifications, 460.
—Specifications of recent orders, 691.

Carhouses and storage yards:
—Boston, Mass.:
Car yard at Dorchester, *362.
—Sand dryer at Buffalo, *121.

Cars:
—Cars purchased 1928, *78.
—Dresden, Germany, three car train, *23.
—Kentucky Traction & Terminal Co.:
Complete replacements, Comments on, 756.
—Los Angeles, Cal.:
New cars for Pacific Electric, *345.
—Louisville, Ky.:
Experimental cars, 624.
New sample cars, *637.
—New cars:
Pay for themselves [Buck], 715.
Produce saving, Comments on, 693.
—Salt Lake City, Utah:
Trackless trolleys [Heiges], *232.
—One-man:
New Birney car, *117.

Central California Traction Co. (See San Francisco, Cal.):

Central Electric Railway Association:
—Business outlook, 209.
—Freight haulage report, 250.
—Meeting at Grand Beach, Mich.:
More profitable business discussed, 782; meeting, 680.
—Meeting of January, 1930:
To be held in Cleveland, 945.
—Indianapolis meeting:
Plans, 101.
Program, 140.

Central Electric Railway Master Mechanics Association:
—Meeting at Youngstown:
Maintenance problems discussed, 490.

Charles A. Coffin prize:
—Award announced, Comments, 190.
—Contest announced, 211.
—Date for filing briefs, 681.
—Winner and contenders for 1929, *975.

Charleston, W. Va.:
—Charleston Interurban R.R.:
Mechanics Association, 219.

Charlotte, N. C.:
—Piedmont & Northern Ry.:
Extension of line, 487.
Extension denied, 181.
Improvements in litigation, 1080.

Chehalis, Wash.:
—Bus installation:
Franchise asked, 683.

Chicago, Aurora & Elgin R.R. (See Aurora, Ill.):

Chicago, Ill.:
—Court revokes bus franchise, 34.
—Grade crossing elimination:
Hearing to be held, 1079.
Work to be done, 1080.
—Parking elimination [Gordan], *312.
—Parking ordinance:
Amendments adopted, 555.
Being enforced, 1079.
—Subway:
For Grant Park, 807.
—Unification ordinance:
Franchise sought, 175.
Hearings, 256.
Bills ready to submit, 449.
Franchise legislation, 554.
Recommendations of city engineer, 740.
Writing of ordinance begun, 804.
"Deadlock Committee":
Attempts settlement, 860.
Gets Tentative financial program, 943.

Chicago, Ill. (Continued):
—Unification of facilities:
Comments on, 1030.
—Chicago Elevated Railways:
American Legion memberships, 682.
—Chicago & Illinois Valley R.R.:
Property acquired, 221.
—Chicago Railways:
Will pay off bonds, 810.
—Chicago Rapid Transit Co.:
Advertising, 473.
Awards service badges, 98.
Fare case valuation, 486.
Fare reduction fought, 393.
Fare hearing continued, 806.
Harley A. Johnson safety award, 613.
Power supervision, *207.
Valuation, 944.
—Chicago Surface Lines:
Bus franchise hearing, 451.
Car order, 416.
Commission bus order reversed, 339.
Co-ordination agreement, 489.
Management, Comments on, 420.
New cars to be bought:
Old steel ties retained, *253.
Operating statement, 454.
—Illinois Power & Light Corporation:
Bus substitution in Quincy asked, 452.
Discontinuance of bus line asked, 683.
Fare trial at Champaign, 259.
Fare revision, 101.
Permission to reduce fares, 136.
Quincy operating statement, 412.
—Illinois Terminal Corporation:
Changes in personnel, 264.
New box cars bought, 306.
—Illinois Traction System:
Changes ordered, 261.
Wage increase, 179.

Chicago & Joliet Electric Ry. (See Joliet, Ill.):

Chicago, Milwaukee & St. Paul R.R.:
Turntable for field coils, *293.
—Chicago, Milwaukee, St. Paul & Pacific R.R.:
Foot operated belt shift for banding armatures, *445.

Chicago, North Shore & Milwaukee R.R. (See Highwood, Ill.):

Chicago, South Bend & Northern Indiana Ry. (See South Bend, Ind.):

Chicago, South Shore & South Bend R.R. (See Michigan City, Ind.):

Chicago & West Towns Ry. (See Oak Park, Ill.):

Cincinnati, Hamilton & Dayton Ry. (See Dayton, Ohio):

Cincinnati, Ohio:
—New boulevard dedicated, *28.
—Rapid transit:
In charge of city manager, 336.
—Union terminal project, 807.
—Cincinnati Street Ry.:
Bus service, *155.
Buses for 13 mile river route, 409.
Car body turn-over truck [Jonas], *797.
Improved sand spout [Kline], *1130.
Newspaper advertising, *217.
Noise reduction by grinding gears [Sawtelle], *660.
Office building new, *169.
Passenger record, 182.
Suburban extensions jeopardize city fare, 1140.
Taxi development studied, 298.

Clarkston, Wash.:
—Lewiston-Clarkston Transit Co.:
Bus substitution, 808.

Cleveland, Ohio:
—Co-ordination of transportation, Comments on, 419.
—Terminal project [Faust], *576.
—Terminal project delay probable, 680.
—Cleveland & Southwestern Ry.:
Discontinuance of line in Creston, 945.
—Cleveland Ry.:
Artificial load for electrical rail joint testing [Brown], *1070.
Brake cam line reamer [Stevens], *1074.
Brake cylinder and air tank removing jack [Leary], *1069.
Brake drum liners "shrunk in" [Rose], *1073.
Brake rod testing machine [Leary], *1130.
Bumping rail [Spenzer], *544.
Bus compressor test stand [Rose], *1134.
Buys 100 cars, 306.
Cable Rack Leakage detector [Braund], *547.
Concrete duct for track switch wires [Brown], 1054.
Coordination by Van Sweringens of Cleveland transportation, 447.
Coupler testing and assembling machine [Scullin], *1068.
Details in trackwork, *824.
Dummy wheels for towing disabled buses [Stevens], 801.
Duplex car, 99.
Electric shovel, *739.
Fare increase, 97.
Fare increase, 139.
Fare increase, 297.
Field polarity testing device [Reinker], *1069.

Cleveland, Ohio (Continued):
Front axle assembling stand [Stevens], *852.
Garage pit covers, *675.
Ground for electric equipment [McIntosh], *796.
Group form for testing equipment [Hankey], *734.
High rate discharge tester [Braund], *285.
Hose jumper for buses [Rose], *1074.
Improvements account of stadium, 614.
Interlocking sequence switching in conversion plants [Masters], *1072.
Jack for installing diest caps [Nobis], *1068.
Jumpers built for work hose [Davidson], *1071.
Method of stringing trolley wire [Scott], *796.
Mirror for inspecting converter [Spindle], 605.
Molding staining or varnishing machine [Sohl], *1068.
One man tie nipper [Croyle], *550.
Overhead pole support for temporary track [Scott], *609.
Pit jack for removing bus transmission units [Scott], *797.
Pole brushing device [Scott], *674.
Portable barrel hoist [Braund], *737.
Portable crossover [Davidson], *252.
Rail sanding truck [Spenzer], *1070.
Rapid track construction [George], *509.
Reclaiming negative battery groups [Braund], *1136.
Reclaiming trolley ears [Scott], *547.
Reclaiming worn converter brushes [Braund], *1072.
Reinforced grooved rail for track drain installation [Bennett], *1071.
Renders aid in Cleveland clinic disaster, 679.
Rope reel [Scott], *286.
Staggered location of poles [Scott], *1072.
Strapping equipment to trolley poles [Brown], *1072.
Synchronous converter lubrication [Braund], *854.
Temporary traffic signs for trackwork [Copeland], *1070.
Tool for armature stick removal [Spindle], *850.
Track ballast spread with grader [George], *1042.
Track gage assures exact spacing of rails [Croyle], *853.
Track lifter with track jack [Bragdon], *1135.
Turning converter armatures [Schultis], *1073.
Wage controversy, 680.
Wilson and Emerson directors, 262.
Winners in maintenance contest, *673.
Yoke for removing armature bearing housings [Dumke], *1069.
—Cleveland, Southwestern & Columbus Ry.:
Permission to increase fares, 136.
—Lake Shore Electric Ry.:
Collision with bus, 335.
Signals at road crossings ordered by commission, 1081.
—New York Central R.R.:
Revolving oscillating valve grinding device [Bullock], *444.
—Cleveland Union Terminal:
Circuit breakers [Bullock], *733.
New shops, 692.

Coffin prize (See Charles A. Coffin prize):

Colorado Springs, Col.:
—Colorado Springs & Interurban Ry.:
To operate despite deficit, 448.

Columbia, S. C.:
—Bus franchise probable, 260.

Columbus, Ind.:
—Interstate Public Service Co.:
Bus substitution, 808.

Columbus, Ohio:
—Columbus Railway, Power & Light Co.:
Asks bus substitution Columbus to Westerville, 866.
Fare increase, 370, 408, 1025, 1079.
Franchise discussion, 864.
New cars in prospect, 944.
New chairman of board, 455.
Seeks to discontinue Westerville service, 1083.
—Scioto Valley Railway & Power Co.:
Franchise to competitor, 683.
—Southern Ohio Public Service Co.:
Sold to American Gas & Electric Co., 100.

Committee on Recent Economics:
—Comments on, 628.
—Prosperity a delicate economic balance, 676.

Connecticut Co. (See New Haven, Conn.):

Conspectus of Indexes:
—Conspectus of Indexes [Richey], 182, 341, 493, 618, 685, 746, 809, 1083.

Cortland, N. Y.:
—Cortland County Traction Co.:
Abandons line, 221.

Covington, Ky.:
—Cincinnatti, Newport & Covington Ry.:
Fare increase denied, 259.

D

Dallas, Texas:
—Dallas Railway & Terminal Co.:
Controller finger trouble [Beadle], *543.
Earnings, 222.
Electrical test board [Beadle], *132.
Extens on asked for, 743.
Form for shaping ferrules [Beadle], *735.
High potential test set [Beadle], *287.
Improved end cover for commutator end frame [Beadle], *1132.
—Texas Electric Ry.:
Freight service, *389.

Davenport, Ia.:
—Tri City Railway:
Bus substitution, 683.
New bus service to Iowa Fair Grounds, 866.
Wage agreement, 682.

Dayton, Ohio:
—Cincinnati, Hamilton & Dayton Ry.:
Modern substation [Rose], *357.
—Dayton & Troy Electric Ry.:
Asks revoking of coach company's certificate, 744.

Delaware, Lackawanna & Western R.R.:
—Educating employees [Morgan], *1100.
—Electrification, *67.

—Electrification:
Plans complete, *769.
Power to be purchased, 336.
Specifications out, 742.

Denver, Col.:
—Denver Tramways:
Change in directorate, 561.
Company newspaper, 219.
Fare increase before council, 1159.
Group insurance, 746.
Operating net improved, 221.
Prize for name of bulletin, 407.

Department of Street Rys. (See Detroit, Mich.):

Des Moines, Iowa:
—Des Moines City Ry.:
Armature d pp ng [Skelley], *730.
Insulation testing, *367.
New wage agreement, 1077.
One man car adopted, Comments on, 1031.
One man car proposal rejected, 861.
Sold under foreclosure, 746.
To be sold, 684.

Detroit, Mich.:
—Accidents at safety zones, *335.
—City employs consulting traffic engineer, 29.
—Motor buses, jitney competition, 295.
—Parking regulations:
Trial enforcement, Comments on, 1092.
—Public hearing called on parking regulat ons, 806.
—Rapid transit, Comments on, 229.
—Subways proposed, 138.
—Subway plan put to vote, 333.
—Subway proposed by city, 804.
—Subway proposal defeated, Comments on, 568.
—Department of Street Rys.:
Auxiliary inflater [Smith], *801.
Bus-car service, 257.
Cooling system flushing machine [Smith], *852.
Cost analysis of track construction [Nolan], 665.
Extends and improves service, *976.
Fare insufficient, 617.
Light weight car, *786.
New service to Dearborn, 1081.
New car order, 381.
Operating records and costs, 301.
Reduc ng noise of car operation [Williams], *513.
Tractor used as shop locomotive [Smith], *1134.
—Detroit, Jackson & Chicago Ry.:
Discontinuance, 946.
—Detroit United Ry.:
Government seeks back income tax, 746.
—Street Railway Commission:
Municipal bond issue, 177.

Discontinuance of lines:
—Akron, O.:
Massillon service, 560.
—Albany N. Y.:
Eastern N. Y. Utilities Corp. seeks to liquidate, 1083.
—Atlantic City:
Atlantic City & Suburban to abandon, 560.
Auburn, N. Y.:
Auburn & Syracuse Ry. to abandon, 493.
—Buffalo, N. Y.:
International Ry. seeks to abandon line, 36.
—Cleveland, O.:
Cleveland & Southwestern discontinues in Creston, 945.
—Columbus, O.:
Columbus Railway, Light & Power Co. seeks discontinuance of Westerville service, 1083.
—Detroit, Mich.:
Detroit, Jackson & Chicago discontinues, 946.
—Hillsboro, Ill.:
Buses unprofitable, 683.

Discontinuance of lines (Continued):
—Jackson, Mich.:
Mich. El. Ry. discontinues line, 684.
—Jamestown, N. Y.:
Discontinuance expected, 376.
—Kansas City, Mo.:
Discontinuance at Independence sought, 377.
—Lawrence, Mass.:
Mass. Northeastern abandons line, 493.
—Milford, Mass.:
Milford & Uxbridge ceases, 36.
—Newcastle, Ind.:
T. H. I. & E. discontinues railway service, 373.
—Oakland, Cal.:
Key system asks for discontinuance, 746.
—Palo Alto, Cal.:
Peninsular Railway abandons line, 1025.
—Princeton, Ill.:
Chicago & Illinois Valley abandonment, 494.
—Rochester, N. Y.:
—Authority to abandon line, Comments on, 756.
—St. Louis, Mo.:
Bus substitution, 339.
Discontinuance of bus line, 374.
—Santa Barbara, Cal.:
S. B. & S. Ry. to discontinue, 561.
—Zanesville, O.:
Southern Ohio Pub. Service Company, 452.

Dispatching:
—London tape method, 212.
—Philadelphia:
Loud speaker for dispatching on P. R. T., *1063.

Duluth, Minn.:
—Duluth Street Ry.:
Fare increase sought, 216.
Special fare for school children, 864.
—Duluth Superior Traction Co.:
Operating statement, 411.

E

Eastern Massachusetts Street Ry. (See Boston, Mass.):

East St. Louis, Ill.
—East St. Louis & Suburban Ry.:
Ticket agent for aviation company, 1025.

Edmonton, Alberta:
—Edmonton Municipal St. Ry.
Sale in prospect, 618.

Electric Railway Association of Equipment Men, Southern Properties:
—Houston, Tex.
Maintenance discussed, 251.
—Meeting at Lexington, Ky., 557, 831.
—Meeting of Jan., 1930, to be held in Birmingham, Ala., 946.

Electric Railway Journal:
—Change in staff organization, 38.
—Convention number.
Commendations. [Smith] [Norris], c1065.
—Convention report number.
Commended. [Lambert], c1065.
—Plan of publication changed, 383.

Elmira, N. Y.:
—Elmira Water, Light & Railroad Co.
Capital stock increased, 262.

El Paso, Texas:
—El Paso Electric Co.:
Accident reduction, 201.
Motor bus garages, *438.
Mule car in parade, 1080.
Popularizing service, *981.
Revolution keeps cars out of Mexico, *554

Employees:
—Charleston, W. Va.
Mechanics' Association, 219.
—Chicago:
Young employees need encouragement. [Rice], c328.
—Delaware, Lackawanna & Western R.R.:
Training of employees [Morgan], *1100.
—General Electric Co.
Attitude toward employees.
Comments on, 569.
—Industrial relations.
Improved by Electric Railways [Vickers], 1043.
—Kansas City, Mo.:
Oratorical contest, 258.
—Operators.
Information for patrons valuable asset. [De Voe], c1064.
—Portland, Oregon:
Twenty-year Club, 258.
—Rushville, Ind.:
Bonus for courtesy, 258.
—Salt Lake City, Utah:
Mutual aid association, 236.
—Training.
Conference method, 773.
Comments on, 756 and 948.

Enid, Okla.:
—Enid City Ry.
Railway franchise cancelled, 943.

European Practice:
—German three-car train, *23.
—Mass transportation service expanding in Europe [Cusani], *646.

Evanston, Ill.:
—Motor bus companies.
Approval of sale asked, 451.

Evansville, Ind.:
—Evansville & Ohio Valley Ry.:
Business outlook improved, 1080.
Receivers' operating statement, 412.
Excursion rates, 408.
—Evansville, Suburban & Newburgh Traction Co.:
Outlook for business improved, 1080.
Reduced rates to improve business, 554.
—Expansion to continue in 1930, 1138.

F

Fairmont, W. Va.:
—Monongahela West Penn Public Service Co.:
Assembly hall for employees, 323.
Testing air equipment [Duffy], *735.

Fare Collection:
—Boston, Mass.:
Boston elevated tries experiment, 944.
—Brooklyn, N. Y.:
Turnstile fare collector for street car, *1137.
—Grand Rapids, Mich.:
Fare box elimination [Lunda], *214.
—Houston, Tex.:
Preventing transfer abuse [Alexander], *1121.
—Mechanical coin fare register:
Ayman Register Co., *1075.
—New York, N. Y.:
Turnstile in street car, 267.
—Norfolk, Va.:
Fare box lights [Hall), *25.
—Philadelphia, Pa.:
New exchange ticket, 297.
—Vienna, Austria:
Four day pass, *401.
—Weekly pass:
Fredonia, N. Y., 216.

Fare decreases:
—Bloomington, Ill.:
Rates lowered, 136.
—Boston, Mass.:
Boston elevated fare test on bus line, 559.
—Chicago:
Fare reduction fought by "L," 373.
—Los Angeles, Calif.
Fare decrease on Pacific Electric Ry., 371.
—Milwaukee, Wis.:
Extension of fare limit denied by commission, 27.
Single fare area extension, 218.
—Minneapolis, Minn.:
Special fare for school children, 1077.
—Nashville, Tenn.:
Reduced commuters' fare, 260.
—Ottawa, Ont.:
Fare reduction, 373.
—Portland, Ore.:
Vancouver rate reduced, 219.
—St. Louis, Mo.:
Fare reduction threatened, 373.

Fare increases:
—Augusta, Ga.:
Fare increase asked, 451.
—Aurora, Ill.:
Fare increase attacked, 373.
—Baltimore, Md.:
Fare Case.
In court, 139.
In Supreme Court, 1080.
—Buffalo, N. Y.:
Operating cost report, 370.
—Chicago:
Chic. Rap. Transit valuation, 486.
—Cleveland, O.:
Cleveland Ry. seeks increase, 97.
Cleveland, Southwestern & Columbus fare increased, 136.
Fare consideration likely, 139.
Fare negotiations, 297.
—Columbus, O.:
Fare increase, 370.
Fare increase postponed, 408.
Fare increase recommended, 1079.
—Covington, Ky.:
Fare increase denied, 259.
—Decatur, Ga.
Georgia Power Co. fare controversy, 915.
—Demand for fare revision:
Comments on, 463.
—Gary, Ind.:
Fare increase sought, 863.
—Grand Forks, N. D.:
New franchise, 447.

Fare Increases (Continued):
—Holyoke, Mass.:
Fares increased, 258.
—Joplin, Mo.:
Fares raised, 743.
—Kansas City, Mo.
Fare increase sought, 218.
Fare increase sought, 298.
—La Crosse, Wis.:
Hearing on fare increase, 259.
—Louisville, Ky.:
Fare increase sought, 295, 373.
Fare action deferred, 615.
Fare increase denied, 681.
—Los Angeles, Calif.:
Fare case in supreme court, 1079.
—Miami, Fla.:
Two-cent fare increase, 863.
—Milford, Mass.:
Fare increase on buses, 339.
—Milwaukee, Wis.:
Hearings for fare plan, 1080.
—Minneapolis, Minn.:
Fare increase authorized, 215.
Fare increase accepted, 373.
Fare increase, 490.
—Montreal, Que.:
Fare increase at St. Catharines, 556.
—New York, N. Y.:
Eighth and Ninth Ave. in supreme court for fare increase, 945.
7-cent fare case, 139.
Fare increase denied Eighth and Ninth Avenue Rys., 742.
Interborough fare increase asked, 864.
Third Avenue Ry. fare case, 679.
—Portland, Ore.:
Fare increase needed, 373.
Fare increase indorsed by labor, 682.
Hearing on fare increase on Portland Electric Power Co., 944.
Portland Elect. Power seeks increase, 613.
—St. Louis:
Fare increase expected, 860.
—St. Paul, Minn.:
Hearing date set, 257.
Fare increase made permanent, 295.
—San Francisco, Cal.:
Seven cent fare trial, 338.
—Sioux City, Ia.:
Fare increase, 259.
Tokens, 488.
—Twin City Rapid Transit Co.:
Fare increase, 175.
—Vancouver, B. C.:
New fare agreement, 488.
—Washington, D. C.:
Fare case of Capitol Traction Co. closed, 945.
—Wheeling, W. Va.:
Fare increase suspended, 259.

Fares:
—American Electric Ry. Ass'n. report 302.
—Chicago, Ill.:
Fare trial at Champaign, 259.
—Cincinnati, O.:
Passenger record, 182.
—Fare, wage, cost statistics, *91.
—Frostburg, Md.:
Weekly pass, 374.
—Levis, Can.:
Increased revenue, *659.
—Milwaukee, Wis.:
Fares discussed, 405.
Increase in patronage on Milwaukee El. Ry. & Lt. Co., 453.
—St. Louis, Mo.:
Fares collected on buses and cars, 746.
—Scientific basis needed [Buck], *905.
—Houston, Tex.:
Scientific fare schedule, *979.
—Seattle, Wash.:
Fares for school children, 681
—Springfield, Mass.:
Report of revenue, 746.
—Third Avenue Ry.:
Rate for school children, 98.
—Wheeling, W. Va.:
Wheeling Traction Co. hearing before Interstate Commerce Commission, 1077.

Federal Trade Commission:
—Field accounting begun on two holding companies, 746.

Financial:
—Akron, Ohio:
New franchise sought, 256.
—Amsterdam, N. Y.:
Bus certificate found reasonable, 491.
—Athol, Mass.:
Operating record, 377.
—Austrian Commission:
Intangible values—comments on, 348.
—Baltimore, Md.:
Operating statement, 376.
Segregation for W.B.&A.E. Ry., 340.
Unusual financing, comments on, 1029.

Financial (Continued):
—Bethlehem, Pa.:
Bethlehem Transit Co. leases, in favor of buses, 180.
—Binghamton, N. Y.:
Foreclosure—Binghamton Railway, 492.
—Boston, Mass.:
Boston Elevated Ry. extensions, 175.
Boston Elevated operating statement, 494.
Boston & Maine buses into Boston, 260.
Comments on extensions, 189.
Eastern, Mass. financial statement, 377.
Eastern Mass., elects, 455.
Eastern Massachusetts pays common dividend, 492.
Extension of lines, 216.
Operating statement, Eastern Mass., 560.
—Bristol, Pa.:
Foreclosure of Bristol line, 618.
—Brooklyn, N. Y.:
Brooklyn City R.R. operating statement, 182.
B.-M.T. operating statement, 412.
—Buffalo, N. Y.:
Operating statement, 302.
—Burlington, Vt.:
Burlington Traction Co. sold, 492.
—Bus Substitution:
Comments on, 348.
—Canton, O.:
Canton Street Car & Bus Co. incorporated, 743.
—Chicago, Ill.:
Car order of Chicago Surface Lines, 416.
Chicago & Illinois Valley R.R. property acquired, 221.
Chicago Railways bonds, 810.
Coordination agreement, 489.
Illinois Traction, Inc., changes, 261.
Operating statement, surface line, 454.
Quincy operating statement, 412.
Unification plan, 943.
Valuation of elevated lines, 745.
—Cleveland, O.:
Coordination of transportation by Van Sweringens, 447.
Improvements account of stadium, 614.
—Colorado Springs, Col.:
Railway to continue despite deficit, 448.
—Committee on Recent Economic Changes:
Report on economic conditions, 676.
—Competition and Rate Making [Cabot], *988.
—Conspectus of Indexes [Richey], 182, 341, 493, 618, 685, 746, 809, 1083.
—Construction Budgets, 345.
—Continental Trading Co.:
Comments on, 420.
—Co-ordination of Community Transportation [Smith], *887.
—Cortland Co. Traction Co.:
Abandons line, 221.
—Dallas, Tex.:
Earnings, 222.
—Denver, Colo.:
Change in tramway directorate, 561.
—Des Moines, Ia.:
Des Moines City Ry. to be sold, 684.
Railway sold under foreclosure, 746.
—Detroit, Mich.:
Detroit Bond Issue, 177.
Fare insufficient for railway needs, 617.
Operating records and costs, 301.
—Duluth, Minn.:
Duluth-Superior operating statement, 411.
—Edmonton, Alberta:
Municipal Railway sale in prospect, 618.
—Electric Bond & Share Co.:
Federal Trade Commission controversy, 101.
—Elmira, N. Y.:
Capital stock increased, 262.
—Evansville, Ind.:
E. & O. V. Receiver's operating report, 412.
—Expenditures mounting:
Comments, 190.
—Financial structure of Electric Railways, 230.
—Financing rapid transit by benefit assessment.
Comments on, 1093.
—Fort Worth, Tex.:
Local financing by advertising, *982.
—Ft. Collins, Col.:
Municipal Ry. operating statement, 453.
—Framingham, Mass.:
Final accounting, 181.
—Gary, Ind.:
Gary Railways to lease lines, 302.
—Germany:
Statistics on German railways, 437.
—Glens Falls, N. Y.:
Hudson Valley Railway sold, 492.
—Governors Comment on Transportation, 177.
—Grand Rapids, Mich.:
Consolidation of transit facilities, 448.
Grand Rapids R.R. needs increased revenue 176.
Operating Statement, 340.
—Greenville, Miss.:
Bus substitution, 559.
—Green Bay, Wis.:
Bus substitution, 559.

Financial (Continued):
—Hamilton, Ont.:
Bus lines acquired, 451.
—Hammond, Ind.:
Hammond, Whiting & East Chicago foreclosure suit, 868.
—Hartford, Conn.:
Railway pays Tucker Grant tax, 341.
—Haverhill, Mass.:
Discontinuance of line, 412.
—Highwood, Ill.:
I.C.C. has no jurisdiction over Chicago, North Shore & Milwaukee, 302.
—Mr. Hoover's Inaugural Address:
Comments on, 384.
—Indiana, State of:
Commission completes field work on merger of electric companies, 810.
—Indianapolis, Ind.:
Receiver asked South Side Motor Coach Co., 559.
Will of Will A. Latta, 743.
—Investment Banker's Association:
Municipal ownership report, 745.
—Jackson, Mich.:
Sale of railway property, 221.
Sale of Mich. Railroad's lines to Michigan Central, 617.
—Japan:
New railway planned, 268.
—J. G. White & Company, Inc. Rebuys British Firms, 417.
—Lexington, Ky.:
Bus line taken over, 300.
Car replacement pays for itself in five years, *759.
—Lincoln, Neb.:
Bus franchise, 221.
—Los Angeles, Cal.:
Bus franchise wanted, 220.
City Club favors railways, 189.
Southern Pacific Co. seeks to buy bus line, 616.
—Massachusetts Department of Public Utilities.
Permits New Haven R.R. to finance trolleys, 867.
—Massachusetts Northeastern Street Ry. Discontinues, 176.
—Memphis, Tenn.:
New track, 226.
—Menash, Wis.:
Bus license fees, 220.
—Michigan Railroad:
Bond deposit time extended, 618.
—Milwaukee, Wis.:
Fare increase needed, 405.
Grade crossing elimination, 227.
—Minneapolis, Minn.:
Dividends resumed by Twin City, 376.
Fare increase, 215.
Foreclosure of Minneapolis, Anoka, and Cuyuna Range Ry., 868.
Rumor of deal for Twin City Company, 867.
—Montreal, Que.:
Tramway bond issue, 142.
—Motor Bus Lines:
Consolidation of long distance lines, 683.
—Muskegon, Mich.:
Muskegon Traction & Lighting Co. Needs fare increase, 179.
Abandonment of service, 222.
—Nashville, Tenn.:
Nashville Railway & Light Co. disputes valuation, 493.
Valuation, 181.
—Newark, N. J.:
Improvements announced, 226.
Operating statement, 558.
Public Service buys buses, 417.
Stock issue approval, 302.
—New York, N. Y.:
B.-M. T. operating statement, 376.
Bus franchise, 218.
Equitable bus certificate denied, 555.
Expenditures for subways, 306.
Jamaica Central increases capital, 376.
Manhattan Bridge 3 Cent Line sold, 493.
Manhattan & Queens receivership ended, 685.
Merger of B.-M. T. & B. C. R.R., 262, 301, 492.
New cars for B.-M. T., 226.
New subway notes, 613.
Ocean Electric Railway, 455, 493.
Premium on stock issue, 684.
Second Ave. Railroad reorganized, 411, 455.
Subways to cost $700,000,000, 344.
Third Avenue bond interest, 376.
Dividend declared, 1145.
Van Brunt St. line to operate 30 days, 302.
—New Orleans, La.:
Discontinuance of line, 341.
Key System Reorganization, 745, 810.
—Oklahoma City, Okla.:
Oklahoma Ry. acquisitions, 618.
Oklahoma Railway Development, *725.
Purchase of Okla. Belt Ry., 455.
—Omaha, Neb.:
Budget for improvements, 416.
Stock holders meeting, 377.
—Ottawa, Ont.:
Earnings insufficient, 302.
—Pennsylvania Public Service Information Committee discontinued, 450.

Financial (Continued):
—Pennsylvania R.R. and P.R.T.:
Bus lines co-ordinated, 179.
Looking to future, comments on, 461.
—Petersburg, Va.:
Acquisition of railway negotiations, 412.
Railway sold, 685.
—Philadelphia, Pa.:
Changes on board of P.R.T., 561.
City Controller questions P.R.T. Accounting, 745.
P.R.T. dividend criticized, 810.
Purchase of P.R.T. underlying companies, 296, 412.
—Providence, R. I.:
Operating statement of U.E.R., 618.
—Puget Sound Power & Light Co.:
Increased capitalization of subsidiary, 143.
—Quincy, Ill.:
Bus substitution asked by Illinois Power and Light Corp., 452.
—Railway and Bus Associates:
Buys Schuylkill Valley Traction Co. and Lebanon Valley Street Ry., 868.
—Reading, Pa.:
Operating statement, 221.
—Rochester, N. Y.:
Operating record, 341.
—St. Louis, Mo.:
Depreciation accounting asked by commission, 810.
Hertz interest in St. Louis sold, 489.
Operating statement, 618.
Railway tax paid in stock, 340.
Street Railway valuation contest, 492.
Subway for St. Louis Electric Terminal Railway, 344.
38 per cent of railway owned by City Utilities Company, 943.
Valuation argued, 262.
—St. Joseph, Mo.:
Bus substitution, 491.
—San Diego, Cal.:
Operating statement, 561.
—San Francisco, Cal.:
Bus lines deficit, 300.
City plans to operate, 334.
Market St. Railway problems, Comments on, 385.
Market St. Ry. position favorable, 1024.
San Francisco offers to buy cable line, 181.
Twin Peaks Tunnel special assessment [O'Shaughnessy], *1094.
Valuation of Market St. Ry., 617.
—Seattle, Wash.:
Cab franchise shelved, 260.
Loan of funds approved, 340.
Municipal Railway suit dismissed, 372.
Puget Sound P. & L. Co. bid for interurban right-of-way, 412.
Purchase of property by city, 222.
Refunding desired for Municipal Ry., 618.
Sale of Tacoma-Seattle Interurban, 560.
Tax for help of railway department, 334.
—South Bend, Ind.:
Reorganization plan for Ohio, South Bend & Northern Indiana Ry., 1083.
—Springfield, Ill.:
Budget of Illinois Power Co., 416.
Stock increase, Illinois Power, 455.
—Springfield, Ohio:
Bids to furnish transportation, 258.
Indiana, Columbus & Eastern Traction Co. offered at receiver's sale, 1083.
Railway reorganization, 182.
—Statistics of 1928 status, *85.
—Stone & Webster, Inc.:
Capital increase, 745.
—Superior, Wis.:
Fare increase asked, 258.
—Tacoma, Wash.:
Tacoma Ry. & Pr. Co. local management, 489.
—Tampa, Fla.:
Operating records, 222.
—Toledo, O.:
Community Traction operating record, 377.
Community Traction Co. report, 494.
Community Traction earnings, 809.
—Transportation Analysis:
Comments on, 109.
—Toronto Transportation Commission:
Financial report, 1145.
—Tulsa, Okla.:
Railway sold under foreclosure, 261.
—Union Traction Co. of Indiana:
Sought by Insull Interests, 809.
—United Corporation:
United Gas Improvement Co. stock, 411.
—United Railways & Electric Co.:
Securities, 181.
—Utilities Service Co., Alliance, Ohio:
Expansion, 182.
—Vancouver, B. C.:
Fare decrease likely, 448.
—Washington, D. C.:
Fare increase for Capital Traction to be asked, 448.
Merger, 221, 262.
Operating records and costs, 261.
—Waterloo, Ia.:
Operating statement U.C.F. & N. Ry., 561.
—Wichita, Kan.:
Valuation of Electric Ry., 617.
—Worcester, Mass.:
Approval to take over leased lines asked, 262.

Financial (Continued):
—Youngstown, O.:
Municipal Ry. operating record, 377.
Protective committee for bondholders, 261.

Fitchburg, Mass.:
—Fitchburg & Leominster Street Ry.:
Bus substitution, 683.
Opposes competing buses, 744.
—Suburban Bus Lines, Inc.:
Certificate restricted, 866.

Fort Collins, Col.:
—Ft. Collins Municipal Ry.:
Operating statement, 453.

Fort Worth, Texas.:
—Northern Texas Traction Co.:
Securities sold locally, *982.

Framingham, Mass.:
—Milford, Framingham, Hopedale and Uxbridge Street Ry.:
Final accounting, 181.

France:
—Paris:
Fares increased, 1142.
Merger of lines, 1081.
Traffic increases, 1081, 1142.
Return of double-deck buses favored, 1142.

Franchises:
—Akron, O.:
Bus substitution sought, 375.
—Albany, Ore.:
New franchise, 613.
—Baltimore, Md.:
Bus franchises sought, 410.
—Boise, Idaho:
Boise & Western R.R. has permit to operate, 945.
—Chicago, Ill.:
Legislation for unification, 554.
—Columbus, O.:
Railway franchise discussion, 864.
Scioto Valley R. & P. Co. competition, 683.
—Enid, Okla.:
Railway franchise cancelled, 943.
—Grand Rapids, Mich.:
Unification of transportation, 371.
—Jacksonville, Fla.:
New franchise, 337, 406, 447, 553, 682, 871.
—Los Angeles, Cal.:
Certificate granted Pacific Electric, 375, 492.
New franchise granted Los Angeles Ry., 864.
—Lynchburg, Va.:
Bus substitution, 616.
—New Brunswick, N. J.:
Bus substitution, 616.
—New era in franchises [Vickers], *878.
—New York, N. Y.:
Equitable Coach Co., 374.
—North Adams, Mass.:
Berkshire Street Ry. seeks new bus lines, 1082.
—Omaha, Neb.:
Bus line extension sought, 375.
—Pennsylvania:
Bus franchises sought in Dtlaware River territory, 410.
—Providence, R. I.:
Bus substitution, 616.
—Requirements:
Comments on, 757.
—Requirements of Franchises:
"Getting Down to Fundamentals," 946.
—San Diego, Cal.:
Bus line extension, 559.
—Springfield, O.:
C. H. & D. Ry. plans to acquire Springfield Ry., 371.
—Subsidies:
Comments on, 271.
—Toledo, O.:
Franchise agreement, Comments on, 694.
—Winchendon, Mass.:
Boston & Maine opposes bus permit, 865.
—Youngstown, O.:
Youngstown Municipal's new franchise, 742, *980.

Fredonia, N. Y.:
—Buffalo & Erie Ry.:
Wage decrease case, 295.
Weekly passes, 216.

Freight and express:
—Attracting new freight business [Thomas], *935.
—C.E.R.A. makes report, 250.
—C.E.R.A. Report:
Comments on, 310.
—Cleveland, O.:
Express service [Brown], *783.
—Dallas, Texas.:
Texas Electric Ry., *391.
—Freight business [McCloy], *192.
—Indianapolis:
I. & S. R.R. freight, 682.
—Los Angeles, Cal.:
Pacific Electric pickup and delivery, 409.
Pacific Electric expands service [Porter], *721.

Freight and Express (Continued):
—Louisville, Ky.:
Louisville & Southern Indiana to erect freight house, 860.
—Pacific Electric Pick-up and Delivery:
Comments on, 694.
—Waterloo, Ia.:
Freight stimulates earnings, 336.

Fresno, Cal.:
—Fresno Traction Co.:
Discontinuance of line, 411.

Frostburg, Md.:
—Cumberland & Westernport Transit Co.:
Weekly pass, 374.

Fuels:
—Buffalo, N. Y.:
Fuel oil for buses, 228.

G

Gadsden, Ala.;
—Alabama Power Co.:
New buses, 865.

Gary, Ind.:
—Midwest Motor Coach Co., 33.
—Gary Rys.:
Accident prevention vacations, 490.
Better service at lower fares saves interurban [Wingerter], *1115.
Celebrates 21st anniversary, 681.
Credit Union Incorporated, 164.
Fare increase sought, 863.
To lease Gary & Southern Traction Co., 302.

Georgia Railway & Power Co. (See Atlanta, Ga.):

Gary & Southern Traction Co. (See Crown Point, Ind.):

Geneva, N. Y.:
—Geneva Ry. Bus Lines, Inc.:
Bus certificate, 180.

Georgia Power Co. (See Atlanta, Ga.):

Germany:
—Double trolley, *156.
—Statistics on electric railways, 437.
—Berlin:
Buses shown at Berlin, *124.
Berlin's traffic problems [Reuter], 973.
—Dresden:
Articulated car design, 392.
—Frankfurt, Germany:
Pay-as-you-pass cars tried, *1102.
—Wiesbaden:
Buses displace trolleys, 33.

Glens Falls, N. Y.:
—Hudson Valley Ry.:
Property sold, 492.

Gloversville, N. Y.:
—Fonda, Johnstown & Gloversville R. R.:
Competing bus line upheld, 491.
Oppose bus line grant, 452.

Grand Forks, N. D.:
—Grand Forks St. Ry.:
Fare increase, 447.

Grand Rapids, Mich.:
—Grand Rapids R. R.:
Car bumpers [Lunda], *368.
City Commission assists in co-ordinating transportation, 333.
Consolidation of transit facilities, 448.
Drivers' creed reduces accidents, 408.
Fare box illumination [Lunda], *214.
Field coil tester [Lunda], *24.
Operating statement, 340.
Relief suggested, 176.
Unification of transportation, 371.
—United Suburban Ry.:
Report favorable, 455.

Great Britain:
—British Railways:
Air transport power, 682.
—Edinburgh:
Moves with the times, as to fares and equipment [Jackson], *1059.
—Electrification of whole trunk railway system planned, 1081.
—Electrification:
Report, 263.
Nearing Completion, 382.
—Liverpool, Eng.:
Integral truck and motor design, *1105.
—London:
Dispatching—Tape, 212.
Bus anniversary, July 4, 682.
Improved truck for Metropolitan Electric Tramways, 1127.
London United Tramways:
Improved car design, 477.
London Underground Rys.:
Conveniences, comments on, 420.
New station at Piccadilly Circus, *439.
Traffic changes, 1081.
Transportation difficult [Ashfield], *974.
—Manchester, Eng.:
Express tramway, 338.
—Station signs, *389.

Great Northern Ry.:
—Electrification, *110.

Green Bay, Wis.:
—Wisconsin Public Service Co.:
Bus substitution, 559.

Greensboro, N. C.:
—North Carolina Public Service Co.:
Bus substitution, 1082.

Greenville, Miss.
—Mississippi Power & Light Co.:
Bus substitution, 559.

H

Hamburg, Germany:
—Hamburg Elevated Ry.:
Pocket below armature bearing prevents oil loss [Hansmann], *1131.

Hamilton, Ont., Can.:.
—Dominion Power & Transmission Co.:
Acquires bus lines, 451.

Hammond, Ind.:
—Hammond, Whiting & East Chicago Ry.:
Foreclosure suit filed, 868.

Hampton, Va.:
—Virginia Public Service Co.:
To try buses, 334.

Harrisburg, Pa.:
—Harrisburg Rys.:
Prolonging life of window wiper [Rexroth], *850.

Hartford, Conn.:
—Taxicabs now common carriers, 807.

Havana, Cuba (See also Cuba):
—Havana Electric Ry.:
Wood in car bodies preserved [Gottschalk], 664.

Haverhill, Mass.:
—Massachusetts Northeastern St. Ry.:
Discontinues line 412, 492.

Heavy electric traction:
—Austria:
Electrification, *350.
—Baltimore, Md.:
P. R. R. agreement on electrification, 1077.
Pennsylvania R. R. electrification, 409.
—British locomotive order, 188.
—Comments on electrification, 109.
—Electrification 1928, *63.
—Electrification growth, comments on 421.
—Equipment purchased 1928, *78.
—Great Northern electrification, *110.
—Hoboken, N. J.:
D., L. & W. electrification plans, *769.
Lackawanna specifications out, 742.
—Japanese electrification, 148.
—Locomotives:
Choosing to fit service [Taliaferro], *1045.
—Oregon-Washington Railway & Navigation Co.:
Electrification likely, 682.
—Pennsylvania R. R.:
Extension of program, *433.
—Pennsylvania R. R. electrification, 487.
—Reading R. R.:
Electrification, 682.
—Statistics on electrification, *67.

Highway Research Board:
—Concrete pavements, 346.

Highwood, Ill:
—Chicago, North Shore & Milwaukee R. R.:
Grade crossing, *356.
Awards merit badges for business improvement, 30.
Interstate Commerce Commission has no jurisdiction, 303.
Service added, 324.

Holyoke, Mass.:
—Holyoke Street Ry.:
Fare increase, 101, 258.
New building on Mount Tom, *861.

Houston, Texas:
—Houston Electric Co.:
Bus substitution controversy, 806.
Scientific fare schedule, *979.
Preventing transfer abuse [Alexander], *1121.

I

Illinois Electric Ry. Assn.:
—Meeting at Springfield, 371, 478.

Illinois Gas Association:
—Meeting at Springfield, 371.

Illinois Power & Light Corporation (See Chicago, Ill.):

Illinois State Electric Association:
—Springfield meeting, 371.

Illinois, State of:
—Chicago, Ill.:
Supreme Court on jurisdiction over streets, 491.
Traction bill signed by governor, 742.
—Gas tax, 557.
—Illinois Commerce Commission approves Chicago-Alton service, 808.

Illinois Traction System (See Chicago, Ill.):

India:
—Bombay:
American & Foreign Power Co. buys interests, 1081.

Indiana Prblic Utilities Assn.:
—Gary, Ind.:
Conventions, 219.

Indiana, Columbus & Eastern Traction Co. (See Springfield, Ohio):

Indiana Service Corporation (See Fort Wayne, Ind.):

Indianapolis, Ind.:
—Hearing on utility merger, 1025.
—Greenville Transportation Co.:
Asks removal of limitations on certificate, 866.
—Indianapolis & Southeastern R. R.:
Freight rates, 682.
—Indianapolis Street Ry.:
Derrick car, *127.
One man car investigation, 370.
Wage hearing to be held, 337.
Wage increase, 373.
Wage demand, 556.
—Interstate Public Service Co.:
Co-ordination of properties, 142.
Livestock train schedules, 1080.
Service through to Louisville, 806.
—Louisville & Southern Indiana Traction Co.:
Freight house in Louisville, 860.
—Indianapolis & Southwestern Traction Co.:
Service from Indianapolis to Cincinnati, 865.
—South Side Motor Coach Co.:
Receiver asked, 559.
—Terre Haute, Indianapolis & Eastern Traction Co.:
Discontinuance of railway service, 373.
Electric and bus fares reduced, 806.
Metal whistle and stop signs [Walker], *1136.

Indiana, State of:
—Merger of Utilities:
Progress, 810.

Insurance and pensions:
—Denver, Colo.:
Denver Tramway insures employees, 746.

Interborough Rapid Transit Co. (See New York City):

International Ry. (See Buffalo, N. Y.):

International Tramway, Local Railway & Motorbus Association. (See Union Internationale de Tramways, etc.):

Interstate Commerce Commission:
—Ruling on bus subsidiaries, 558.

Interstate Public Service Co. (See Indianapolis, Ind.):

Interstate Street Ry. (See Attleboro, Mass.):

Interurban railways:
—Appearance should simulate railroads. [Snow], c1065.
—Freight Business:
Principal factor in development [Conway], *963.

Iowa, State of:
—Tax—ton mile, 220.

Iowa Electric Railway Association:
—Meeting in Waterloo, Ia., 806, 1078.
—Meeting at Waterloo, Ia.:
Car equipment improvement topic, 1118.

Italy:
—New tramway under construction, 338.
—Railway construction, 418.

Ithaca, N. Y.:
—Ithaca Traction Co.:
Emergency splicing car [Reifschneider], *610.
Pedal gong ringer [Reifschneider], *734.

J

Jackson, Mich.:
—Michigan Electric Ry.:
Discontinues line, 684.
Sale of Property, 221.
—Michigan R. R.:
Lines to be sold to Michigan Central R. R., 617.

Jacksonville, Fla.:
—Jacksonville Traction Co.:
Franchise, 337, 406, 447, 553, 682, 871.
Safety Prizes, 206.
Wins Stone & Webster, Inc., prize in advertising, 681.

Jamaica Central Rys. (See New York City):

Jamestown, N. Y.:
—Jamestown Street Ry.:
Asks bus certificate, 339.
Bus service changes, 491.
Service extended, 299.
—Warren & Jamestown St. Ry.:
Discontinuance expected, 376.

Japan:
—Asaka, Jap.:
Subway to be built, 682.
—Electrification contemplated, 1142.
—New Electric Railway Planned, 268.
—Tokio:
Uses western traffic control, *1104.
World Engineering Congress discusses transportation, 1103.
—Trackless Trolley, 777.

Joliet, Ill.:
—Chicago & Joliet Transportation Co.:
Passengers in 1928, 143.

Joplin, Mo.:
—Joplin-Pittsburgh R. R.:
Seeks to acquire Joplin & Pittsburg Railroad, 807.

K

Kansas City, Kaw Valley & Western Ry. (See Bonner Springs, Kans.):

Kansas City, Lawrence & Topeka Electric Ry. (See Lawrence, Kans.):

Kansas City, Merriam & Shawnee R. R. (See Lawrence, Kans.):

Kansas City, Mo.:
Traffic regulation, 34.
—Kansas City Public Service Co.:
Discontinuance of Independence Line, 377, 1025.
Fare increase sought 218, 298.
High speed schedule, 804.
Limited stop plan speeds cars [Fennell], *1055.
Oratorical contest, 258.
Portable hydraulic lift. [Briar], *850.
Skip stop plan, 407.
Comments on, 1031.
Track built in 1928, 381.

Kentucky Association of Public Utilities:
—12th annual meeting, 140.

Kentucky, State of:
—Commission unlikely, 743.

Kentucky Traction & Terminal Co. (See Lexington, Ky.):

Key System Transit Co. (See Oakland, Cal.):

Knoxville, Tenn.:
—Knoxville Power & Light Co.:
Automatic substation, 226.
New buses, 1082.

L

Lackawanna & Wyoming Valley R.R. (See Scranton, Pa.)

La Crosse, Wis.:
—Mississippi Valley Public Service Co.:
Fare increase hearing, 259.

Lafayette, Ind.:
—Lafayette St. Ry. Inc.:
Comments on, 150.
Modern railway, *152.

Lake Shore Electric Ry. (See Cleveland, Ohio).

Legal:
—Anderson, Ind.:
Hearing on bond sales of Union Traction Co., 944.
—Baltimore, Md.:
Fare case to go to Supreme Court, 553.
—Georgia Power Co.:
Supreme Court to test ruling on 5-cent rate, 1077.
—Illinois Supreme Court:
Bus franchise hearing, 451.
City jurisdiction over streets, 491.
—Illinois:
Railways oppose bus grants, 744.
—Indiana Harbor, Ind.:
Bus operator enjoined, 866.
—Indianapolis, Ind.:
Pavement in tracks, 807.
Union Traction sale enjoined, 1025.
—Iowa:
Bus tax, 220.
—Kentucky:
Abandonment of depot, 378.
—Legal notes, 37, 223, 562.
—Louisiana:
Railway not liable if not negligent, 378.
—Louisville, Ky.:
Louisville Ry. in Federal Court in fare case, 867.
Louisville Railway fare case in Federal Court, 943.

Legal (Continued):
—Massachusetts:
Contractual factory bus service upheld by court, 865.
—Michigan:
Damage to land not taken, 378.
—New York City:
Ambulance chasing ban, comments on, 385.
Ambulance chasing forbidden, 406.
Court of Appeals on personal injury case, 378.
Interborough fare case, comments on, 569.
Power of eminent domain, 378.
—New Jersey:
Man dismounting from truck near track, 378.
Revoking bus consents, 378.
—Ogden, Utah:
Receivership lifted, 453.
—Oklahoma:
New law affecting carriers, 866.
—Ohio:
Revoking of interstate bus certificate, 378.
Free bus service forbidden by injunction, 1144.
—Philadelphia Rapid Transit:
Purchase of underlying companies by city, 103.
—Regulation for bus and truck carriers, 1143.
—St. Louis, Mo.:
Holding company case appealed, 809.
—Supreme Court:
Decides O'Fallon case, 684.
Comments on, 628.
—Taxicabs Rates:
Regulation needed, comments on, 755.
—Virginia:
Bus franchises, 220.
—Wheeling, W. Va.:
Rate hearing postponed, 406.

Legislation for Railways:
—Boston, Mass.:
New Boston elevated bill, 370.
Public control bill before legislature, 335.
—C.E.R.A. address on regulation, comments on, 311.
—Chicago, Ill.:
Consolidation bills ready, 449.
Electrification bill killed, 743.
Traction bill signed by governor, 742.
—Illinois, State of:
Chicago traction bills pending, 680.
—Indiana:
Interstate Commerce act, 98.
Many bills in assembly, 300.
—Interstate Bill:
Passage not likely, 374.
—Iowa:
Paving obligations relief, 615.
—Maryland:
Private auto license, 614.
Regulation of painting, 206.
Election of commissioners voted down, 408.
—Massachusetts, State of:
Bill authorizing bus operation, 410.
Special bill for Ashmont buses, 683
Massachusetts jitneys, 297.
—Minnesota:
Jurisdiction of commission, 557.
Penalty for illegal operation, 300.
—Missouri:
One man operation, 337.
Rapid Transit bill, 337.
Terminable permits, 682, 740.
—New York State:
Motor vehicle highway law, 452.
Extension of time for electrification, 490.
Legislature actions, 555.
Paving bill offered, 337.
Thayer bill—motor bus control, 559.
Public service commission requests wider power, 337.
Transit control bill opposed by I.R.T., 449.
Unification bill, 297.
—Pennsylvania:
One man car, 101.
—Regulation [Van Doren], 197.
—Seattle, Wash.:
Municipal Railway Commission, 451.
—Texas, State of:
Commission measure fails, 680.
Regulation of utilities, 297.

Lehigh Valley Traction Co. (See Allentown, Pa.)

Levis, Quebec, Can.:
—Levis Tramways:
Increased revenue, *659.

Lexington, Ky.:
—Kentucky Traction & Terminal Co.:
Complete car replacement, *759.
Takes over bus line, 300.

Lima, Ohio:
—Lima City Street Ry.:
Changes in Lima properties, 144.

Lincoln, Neb.:
—Lincoln Traction Co.:
Bus franchise, 220.

Loading Platforms:
—Rochester subway, *163.

London, Ont., Can.:
—London Street Ry.:
Wage controversy, 555.
Wage proposal accepted, 807.

Long Island R.R. (See New York City).

Los Angeles, Cal.:
—City Club favors street railway, 218.
Comments, 189.
—Los Angeles Ry.:
Adequate equipment and careful attention vital to bus maintenance [Jordan], *1124.
Bus certificate granted, 220.
Fare case, 223.
Fare case in Supreme Court, 1079.
Freight and express, 409.
New franchise granted, 864.
Portable emergency track, *600.
—Pacific Electric Ry.:
New bus grant, 492.
Applies for certificate in Pasadena, 866.
Asks certificate to operate buses, 1020.
Bus franchise asked for, 375.
Bus line approved, 339.
Bus service extended, 683.
Discontinuance of Santa Anna service asked, 683.
Fare decrease, 371.
Freight and express expanded [Porter], *721.
New cars, *345.
Pick-up and delivery service, comments on, 694.
Rapid transit improved, 336.
Stock sale for bus operation, 34.
—San Jose Railroad:
Discontinuance of ore line franchise for new line sought, 375.

Louisville, Ky.:
—Ordinance:
Regulates taxicabs, 374.
—Louisville Ry.:
Accident prevention, 291.
Appraisal of property, 453.
Broadcasting, 682.
Buses wanted, 180.
Elimination of stops, 864.
Experimental cars, 624.
Fare case action deferred, 615.
Comments, 309.
Fare case in Federal Court, 943, 1138.
Fare case, error in publication, 1081.
Fare increase, 295, 373, 681.
Franchises valid:
Grade crossing elimination, 124.
Improvements, 236.
In Federal Court in fare case, 867.
Loading platforms requested by railway, 28.
Newspapers used for publicity, 334.
Raising paved track to proper grade [Gleason], *854.
Removing housings of barrel motors [Senior], *1132.
Sample cars, *637.
Trolley operated traffic signals, *835.

Lowell, Mass.:
—Lowell & Fitchburg St. Ry.:
Change of trustee sought, 453.

Lubrication:
—Babbitting bearings effect on lubrication [Kauffman], 114.
—Light oils for car bearings [Hellman], *535.
—New York:
Lubrication of motormen's valves, *25.
—Oil in barrels, protect from weather [Kauffman], 519.
—St. Petersburg, Fla.:
Oilers for car trucks [Marsh], *253.

Lynchburg, Va.:
—Lynchburg Traction & Light Co.:
Bus substitution, 616.
New one man cars, 1081.
Plans for new carhouse, 1080.

M

Maintenance data:
—Buses:
Accurate garage records [McArthur], *531.
Connecticut Co. daily check, *789.
—General:
New Orleans cost record, comments on, 500.
—Track:
Maintenance costs [Mall], *527.

Maintenance equipment:
—Buses and trucks:
Adequate equipment and careful attention needed [Jordan], *1124.
Auxiliary tire inflater [Smith], *801.
Bus compressor test stand [Rose], *1134.
Buzzer for car and bus, *738.
Cooling system flushing machine [Smith], *852.
Hyatt single-row radial roller bearing, *1075.
Front axle assembling stand [Stevens], *852.
Garage pit covers [Rose], *675.

Maintenance Equipment:
—Buses and trucks (Continued):
Hand truck for bus engines, *852.
High pressure grease system [Hall], *676.
High rate discharge tester [Braund], *285.
Mack bus with low engine speed, *611.
Manley Mfg. Co. dolly for bus wheels, *855.
Mirrors improves pit lighting, *852.
Motor-operated garage sweeper, *1135.
Overhaul pits covered by grating, *737.
Pit jack for removing transmission units [Rose], *797.
Radiator filling station [Clegg], *286.
Tractor used as shop locomotive [Smith], *1134.
—Car equipment:
Bow collectors in Toronto, *833.
Coupler testing and assembling machine [Scullin], *1068.
Improved equipment needed, comments on, 568.
Pedal gong ringer [Reifschneider], *734.
Prolonging life of window wiper [Rexrath], *850.
Silencer stops trolley noise and reduces wear, *1137.
Sill heater prevents ice on window, *803.
Trolley wheels [Silbestein], 731.
—Electrical shop:
Armature dipping tank [Wendell], *709.
Armature winder's tool and material stand, *1133.
Armature winding stand [Chiles], *402.
Belt shift for banding armatures, *445.
Circuit breakers [Bullock], *733.
Cutler-Hammer unbreakable resistor, *856.
Electrocon Corporation, portable dynamic balancing equipment, *677.
Fan cooled totally enclosed motor, 446.
Field polarity testing device [Reinker], *1069.
G. E. Co. non-corrodible resistors for railway service, 855.
High potential test set [Beadle], *287.
Improved switch for flashlights [Tipton], *851.
Lincoln Electric Co. safety starter for shop motors, *856.
New oil switch, *802.
Protective panel for 600 volt motors, 485.
Safety push button control, *446.
Test board for equipment [Clegg], *800.
Turntable for field coils, *293.
Valve grinding device [Bullock], *444.
Water cooled carbon electrode holder (Lincoln Electric Co.), *611.
Winding stand for compressor armatures, *849.
—General:
Ball bearing, new design, *738.
Chain pipe vise, *738.
Comments on home manufacture, 107.
Electric drill, heavy-duty, *739.
New equipment offered, *404.
Sand drying, *479.
Suggestions for improvements, 133.
Useful equipment from the manufacturer, *677.
Yoke for removing armature bearing housings [Dumke], *1069.
—Line:
Pole brushing device [Scott], *674.
Rope reel [Scott], *286.
Test of line breakers [Beers], *666.
Tower truck, *481.
—Machine shop:
Arc welding outfit, *485.
Boring machine for bearings [Hansmann], *800.
Car body turn-over truck [Jonas], *797.
Cylinder boring machine [Hall], *330.
Heavy-duty swing grinder, *802.
Hisey-Wolf Machine Co., grinder, *369.
Oxweld Acetylene Co.—generator, *369.
Pit oven, portable, *203.
Portable hydraulic lift [Briar], *850.
Truck for welding equipment, *849.
—Paint shop:
Molding, staining or varnishing machine [Sohl], *1068.
Ventilation for spraying room, *483.
—Track and way:
Artificial load for electrical rail joint testing [Brown], *1070.
Double-gage crossover [Hall], *610.
Electric shovel, *739.
Ground for electric equipment [McIntosh], *796.
International Steel Tie Co., mortor flow pulsator, *677.
New shape for steel tie, *446.
Portable track, *600.
Rail sanding truck [Spenzer], *1070.
Stationary track department crane [Hall], *853.
Track switch coil cylinder vise [Herms], 550.
Sullivan machinery Co., concrete breaker, *677.
—Trucks:
Babbitt Mold, *402.
Brake cylinder and air tank removing jack [Leary], *1069.
Brake rod testing machine [Leary], *1130.
Hand truck for transporting wheels, *1131.
Pneumatic jig for truck assembly [Devers], *675.
Side and center bearings, *485.
Testing air equipment [Duffy], *735.

Maintenance Men's contest:
—Contest Teachers Better Methods [Hall], c729.
—New Contest Announcement: Rules to Govern, 1067.
—Prize Awards by Electric Railway Journal, 629, *673, *794.
—San Diego, Cal.: Award stimulates performance [Mason], c1065.
—Trophy, *732.
—Winners, *278.

Maintenance practice. (See also Repair shops and equipment)
—Buses and trucks:
Brake drum lines "Shrunk-In" [Rose] *1073.
Brake lining, diagonal cut lessens glazing, *552.
Bus engines, limbering up [Hall], *403.
Clutch brake disk [McKenzie], *130.
Crank shaft sunport for fitting connecting rods, *552.
Economical maintenance [Hughes], *17. Comments on, 2.
Heated chamber gives clear vision for cars and buses, *552.
Hood mounting fixture, *1074.
Hose jumper for buses [Rose], *1074.
Jig for drilling pistons, *1132.
Maintenance facilities important, comments on, 501.
Portable grease reservoir, *546.
Rain trough for bus engines, *508.
Rebabbitting connecting rods for bus engines [Marsh], *607.
Repairing brake cams [Herms], *253.
Well standardized, *520.
—Car equipment:
Aluminum protector for window sill [Hall], *1130.
Chromium plating, *517.
Chuck and jig for finishing axle bearings [Herms], *24.
Coupler contact block repairs [Herms], *330.
Improved sand spout in Cincinnati [Kline], *1130.
Key for axle bearing [Holt], *131.
Lanterns [Spencer], 214.
Making gear cases tight, *549.
Overhauling brake rigging [Hicks], *131.
Pipe bumpers on cars [Lunda], *368.
Roller sign holder [Watkin], *548.
Seats, *213.
Special inspection [Squier], *273.
Spring cushioned rattan seats [Brill], *612.
Waste press, *331.
—Electrical shop:
Aligning banding grooves, *126.
Armature dipping [Skelley], *730.
Armature rewinding [Roe], *280.
Armature testing [Beers], *798.
Atomic-Hydrogen welding [Alexander], 612.
Brush pressure adjustment [Clegg], *544.
Cable rack leakage detector [Braund], *547.
Cast grid resistors [Beers], *731.
Cement for repairing mica [Warner], *1123.
Checking armature defects, 125.
Controller handle bases [Marsh], *444.
Controller finger trouble [Beadle], *543.
End cover for commutator end frame [Beadle], *1132.
Field coil tester [Lunda], *24.
Form for riveting controller finger tips, *736.
Form for shaping ferrules [Beadle], *735.
Insulation testing, *367.
Jig for field terminals, *484.
Mirror for inspecting converter [Spindle], 605.
Pocket below armature bearing prevents oil loss [Hansmann], *1131.
Preventing loose armature bands [Marsh], *549.
Railway armatures [Beers], *289.
Railway motor brush holders [Cresswell], *676.
Reclaiming negative battery groups [Braund], *1136.
Removing armature wire bands, *125.
Removing commutator leads, *125.
Saving solder, *445.
Straightening core tooth laminations, *126.
Synchronous converter lubrication [Braund], *854.
Testing friction tape [McKelway], 736.
Testing insulation of armatures [Naquin], *548.
Undercutting commutator mica [Pontius], *799.
—General:
Chromium plating, comments on, 500.
Comments on, 108.
Electric Ry. Assn. of Equipment Men: Maintenance Problems, 251.
Group form for testing equipment [Hankey], 734.
High strength bronze welding rod, 446.
Inspection, comments on, 270.
Organization important [McAloney], 832.
Portable barrel hoist [Braund], *737.
Pull-ins [Hall], *733.
Unloading trestle material handling [Hall], *551.
—Line:
Aluminum cell lighting arresters [Foote], 392.
Maintenance Practice (Continued):
Emergency splicing ear [Reifschneider], *610.
Interlocking sequence switching in conversion plants [Masters], *1072.
Method for stringing trolley wire [Scott], *796.
New dead-end sling, *855.
Overhead maintenance [Birch], *539.
Overhead pole supports for temporary track [Scott], *609.
Pole rack [Hall], *737.
Reclaiming steel tubular span wire poles, *854.
Reclaiming trolley cars [Scott], *547.
Reclaiming worn converter brushes [Braund], *1072.
Renewable pan trolley frog, *1137.
Staggered location of poles [Scott], *1072.
Strapping equipment to trolley poles [Brown], *1072.
Trolley cars with high conductivity lips [Westinghouse], *612.
Trolley troughs [Engelhardt], *285.
Trolley wire breaks prevented [Trautman], *506.
Turning converter armatures [Schulte's], *1073.
—Machine shop:
Air brake gaskets, storage, *545.
Air compressor bearings reamed, *403.
Carbon paste by Oxweld Acetylene Co., 855.
Fused lamp bank, *444.
Oil reclaiming [Hall], *214.
Revolving tool and material rack, *546.
Storage methods, *213.
Straightening front end channel irons [Pressler], *849.
Wood strip platforms, *545.
—Motors:
Maintenance of carbon brushes [Dobson], *1061.
Key seats [Herms], *213.
—Motor Buses:
Comments on, 311.
—Paint shop:
Hood for paint fumes, *445.
Mileage basis, *605.
Painting screens [Patison], *735.
—Southern Properties:
Costs reduced [Hecker], *596.
Equipment maintenance on, comments on, 500.
Maintenance standards raised [Hecker], *667.
Saving in six years [Hecker], *502.
—Track and way:
Assorted layout of track materials [Newman], *1135.
Bonds taped to prevent electrolysis [Coyle], *288.
Bumping rail [Spenger], *544.
Creosoted pine ties relaid after long service, *1123.
Expansion joint [Kinnear], *543.
Jumpers built for work hose [Davidson], *1071.
Maintenance of electric switches [McAdam], *1052.
Metal whistle and stop signs [Walker], *1136.
One man tie nipper [Croyle], *550.
Rail clips for emergency repairs [Drowley], *607.
Rail lifter with track jack [Bragdon], *1135.
Raising paved track to proper grade [Gleason], *854.
Reinforced grooved rail for track grain installation [Bennett], *1071.
Repairing manganese wear plates [Batto], *551.
Repairing manganese castings [Fennell], *608.
Switch box support [McCallum], *609.
Tamping pads [Batto], *287.
Temporary traffic signs [Copeland], *1070.
—Trucks:
Heat-treated bolts for railway service [Whitney], *1123.
Jig for dowel pin holes [Herms], *484.
Journal bearings milled, *549.
Journal polishing tool, 368.
Repairing car trucks without dismantling, *1133.
Reservoir drain valve, *736.
Wheel grinder, *331.

Maintenance Tools:
—Axle Tongs [Herms], *402.
—Brake Dam Line Reamer [Stevens], *1074.
—Broach for Slide Valve Seats [Hensler], *129.
—Chuck for Armature Bearings [Herms], *288.
—Chuck for Expanding Key Washers, *484.
—Cleveland, O.: Jack for installing dust caps [Nobis], *1068.
—Commutator Mica Drill, *739.
—Commutator Slotting Hand Saw, *445.
—Cotter Key Extractor [Tipton], *132.
—Dummy wheels for towing Disabled Busses [Stevens], *801.
—Economical Tools, *171.
—Electric Hand Saw, *802.
—Electrode Holder for Metallic Arc Welding, *803.
Maintenance Tools (Continued):
—Expanding broach for bearing shell [Herms], *1131.
—Grinder, *214.
—Jig for machining bus connecting rods [Marsh], *1133.
—J. G. Blaunt Co., Tap Grinder, 855.
—Machine for Removing Insulation from Wire, *803.
—Mandrel for machining axle bearings [McGill], *1132.
—Mandrel for Turning Brake Drums [Herms], *674.
—Metals Coating Co.: Spray Gun for applying metal coat, *856.
—Nut Wrench for Air Compressor Commutator, *801.
—Piston Ring Compressor [Herms], *129.
—Removing housings of barrel motors [Senior] *1132.
—Special Tools for Heater Installation [Reeves], *851.
—Special Wrenches, *293.
—Suggestions for Improved Equipment, *173.
—Tool Cabinet, *252.
—Tool for Armature Stick Removal [Spindle], *850.
—Track gage assures exact spacing of rails. [Croyle], *853.

Management:
—Economics of transportation: Comments on, 507.
—Efficiency in operation: Comments on, 269.
—Executives' views on fundamental problems, 920.
—Leadership requires perspective, 499.
—Preparation for greater progress [Barnes], *826.
—Preparation for greater progress [Sharp] *877.
—Regional conference, San Francisco: Problems of importance to industry, 441.
—Skillful management improves railway position in 1928, 567.

Manhattan & Queens Traction Co. (See New York City):

Market Conditions:
—American Brown Boveri Electric Corporation: New subsidiary organized, 692.
—American Car Co.: F. L. Markham Sales Mgr., 818.
—Bedford, Mass.: New car details, 874.
—Bender Body Co.: Increases capacity, 817.
—Brooklyn car order, 942.
—Budgets: Construction programs, 416.
—Building construction declines, 382.
—Business News: Proposed construction, 39.
—Bus orders, 816.
—Car buying activity, 816.
—Cincinnati Car Corporation: Election of officers, 148.
—Cleveland, O.: New electric locomotives, *872.
—Comment on cost, 150.
—Consolidated Car Heating Co. gets order for 282 D.L.&W. R.R. cars, 1089.
—Construction programs, 623.
—Convention bus exhibits produce inquiries, 1089.
—Copper prices high, retards buying, 624.
—Delaware, Lackawanna & Western lets contract for cars, 873.
—Des Moines, Ia.: New cars received, 874.
—Equipment market, 186.
—Equipment orders, 458, 497.
—Exports, 148.
—Gas-electric bus by St. Louis Car Co., 817.
—Gasoline tax in New York, 180.
—Gear inspection standardized, 817.
—General Cable Corporation: Copperweld wire, 626.
—General Electric Co.: Mazda lamp prices reduced, 382. Sales increase, 1089.
—Improvement projects announced, 564.
—Industrial Truck Ass'n. organized, 307.
—J. G. Brill Co.: Cars to South America, *625. To build cars for Lynchburg, Va., 1089.
—Laconia Car Company liquidates, 754.
—Lehigh Valley considers electrification, 816.
—Market and trade notes, 690.
—Material prices, 40, 148, 188, 228, 268, 308, 346, 382, 418, 460, 626, 754, 818, 874, 1090.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Abbreviations: *Illustrated. c Communications.

Market conditions (Continued):
—Merger—Commonwealth Steel Co. and General Steel Casting Co., 626.
—Mexico importations, 459.
—Montreal, Que.:
New cars, 818, 874.
—Motor bus additions to electric railways, 754.
—New York, N. Y.:
New cars and equipment for subways to be bought, 1024.
Subway equipment bids opened, 872.
Subway equipment contracts let, 1089.
—North Carolina Public Service Co.:
New cars, *873.
—Ohio Brass Co.:
Entertains engineers, 817.
—Ohmer Fare Register Co. expands, 498.
—Purchases and proposed improvements, *752.
—Recent bus orders, 872.
—Rolling stock orders, 624.
—St. Louis Car Company:
Gas-electric six-wheel bus, *1090.
—Stock market crash:
Railways not seriously affected, 1191.
—The De Vilbiss Company:
Reorganization, 308.
—Trade notes, 626.
—Trolley bus by J. G. Brill Co., 817.
—Twin Coach Co.:
Officers elected, 307.
—Valentine & Company:
Elects officers, 344.
—Washington, Baltimore & Annapolis trailer cars ordered, 872.
—Weekly business indicators, 40, 147, 188, 228, 418, 460, 498.
—Westinghouse Electric & Manufacturing Company:
Site for warehouse in Newark, 1090.
Large railway orders, 1090.
Annual report, 498.

Market Street Ry. (See San Francisco, Cal.):

Maryland Utilities Ass'n.:
—Meeting at Ocean City, Md., 945.

Massachusetts, State of:
—Department of Public Utilities:
Permits New Haven R.R. to finance trolleys, 867.
Reports on buses, 179.
—Legislation—jitney service, 297.

McGraw-Hill Publishing Co.:
—Acquires *Aviation*, 372.

Memphis, Tenn.:
—Memphis Street Ry.:
Bonds taped to prevent electrolysis [Coyle], *288.
Creosoted pine ties relaid after long service, *1123.
New track, 226.
—Parking of cars:
Being considered, 1079.

—Menasha, Wisc.:
—Wisconsin-Michigan Power Co.:
Bus license fees, 220.
Bus controversy settled, 452.

Merchandising transportation (See also Traffic Stimulation):
—Advertising:
General use, *427.
Mitten tours advertise scientifically [Keenan], *587.
—Comments on, 419.
—Confidence needed [Cummings], *917.
—Newark, N. J.:
Public Service chartered buses, *1048.
—El Paso, Texas:
Popularizing service, *981.
—Roanoke, Va.:
Selling tickets and passes, 488.
—Short riding:
A neglected opportunity, 1029.
—Springfield, Mass.:
Going after business, 1082.

Methuen, Mass.:
—Massachusetts Northeastern St., Ry.:
Discontinues, 176.

Miami, Fla.:
—Miami Beach Ry.:
Fare increase, 863.

Michigan City, Ind.:
—Chicago, South Shore & South Bend R.R.:
Advertising, 487.
Coffin prize winner, comments on, 948.
Diner service, 450.
Losses converted to profits, *975.
New cars, 227.
Officials, winners of Coffin prize, *972.
Pullman service, 361.
Relocation in East Chicago, Ind., 868.
Service improved, 168.
Spring switch with oil buffer [Underwood], *836.
Track construction [Hubenthal], *392.
Winner of Charles A. Coffin prize for 1929, *975.

Michigan, State of:
—Utilities Commission test case, 339.

Middle Atlantic States Association of Railway Equipment Men:
—Meeting at Wilmington, 652.
—Meeting at Richmond, 1140.

Midwest Electric Railway Association:
—Meeting in St. Louis, 676, 711.
—Programs for St. Joseph meeting, 178.
—Meeting:
Rates discussed, 329.

Milford, Mass.:
—Milford, Framingham & Uxbridge Coach Co.
Fare increase, 339.
—Milford & Uxbridge Street Ry.:
Railway operation discontinued, 36.

Milwaukee, Wis.:
—Extension of fare limit denied by commission, 27.
—Grade crossings elimination, 39.
—Milwaukee Electric Railway & Light Co.:
Fare decrease, 218.
Fares discussed, 405.
Grade crossing elimination, 227.
Hearing for fare plan, 1080.
Improvement cost high, 381.
Improvements in service, 99.
Mercury arc rectifiers, *471.
Rapid Transit lines pushed, 407.
Service speeded up, 1141.
Substation operators, *360.

Minneapolis, Minn.:
—Minneapolis, Anoka and Cuyuna Range Railway:
Foreclosure, 868.
—Minneapolis Street Ry.:
Fare increase ordered, 215.
Track construction program, 266.
—St. Paul City Ry.:
Fare increase ordered, 215.
—Twin City Rapid Transit Co.:
Dividends resumed, 376.
Fare increase, 373, 490.
Fare for school children, 1024, 1077.
Municipal ownership, 337.
Rumor of change of control, 867.
Sells the Yellow Cab Company, 141.
Tower truck, *481.

Minnesota, State of:
—Bus law penalties, 300.
—Minnesota R.R. & Warehouse Commission:
Jurisdiction, 557.

Montgomery, Ala.:
—Alabama Power Co.:
Armature dipping tank [Wendell], *799.

Montreal, Can.:
—Subways:
Talk revived, 864.
—Canadian National Electric Railway:
Fare increase, 556.
—Montreal Tramways:
Extends line to Mount Royal, 946.
Mercury arc rectifiers [de Angelis], *778.
New cars to be ordered, 381.
No parking after snow storms, *437.
Offers bonds, 142.
Track construction, *250.

Motor buses:
—A. R. A. Motor Transport Division:
Railroads discuss motor bus, 405.
—Birmingham, Ala.:
Buses asked for, 299.
—Buses in Germany, *124.
—Cincinnati bus service, *155.
—Comments on, 3.
—El Paso, Tex.:
Garages, *438.
—Fuel oil tests:
Comments on, 151.
—Fuel oil used by P. R. T. [Queeney], *165.
—Installation statistics, 71.
—Interstate operation:
Comments on, 309.
—Los Angeles, Cal.:
Motor bus line approved, 339.
—Massachusetts Dept. of Public Utilities report, 179.
—Steam operated, *323.

Motor bus, Design:
—New objectives govern design [Faust], *925.
—New body design for Mack buses, *678.
—New White bus, *738

Motor buses, Gas-Electric:
—Acceleration:
Comparison of gas-electric and mechanical drive [McLaughlin], *699.

Motor bus, Installation:
—Akron, Ohio:
Northern Ohio's new lines, 558.
—Baltimore, Md.:
De Luxe bus service, 865.
—Essential factor in co-ordination [Cooke], *930.

Motor bus, Installation (Continued):
—European practice:
Ratio of railways and buses, 474.
—Knoxville, Tenn.:
New buses, 1082.
—New Haven, Conn.:
Bus substitution on Connecticut lines, 375.
—New York City:
Bus substitution would not correct transportation troubles, 1091.
—Richmond, Va.:
New buses for Richmond, 1082.
—Rome, Ga.
Motor bus service, 559.
—Toronto, Ont.:
Railways dominate bus field, 616.

Motor bus, Jitney competition:
—Chicago, Ill.:
Jitneys ordered off streets, 616.
—Detroit, Mich.:
Jitney competition, 295.

Motor bus, Operating practice:
—Baltimore, Md.:
Cooling system for engines [Hughes], *661.
—Newark, N. J.:
Big business in chartered buses, 865.
Public service chartered buses, *1048.
—New York:
Tow rope with spring, *368.
—Society of Automotive Engineers:
Bus development discussed at Toronto, 1129.
—Trend of development, Comments on, 1092.

Motor bus, Regulation:
—Massachusetts, State of:
Trucks curbed in passenger service, 744.
—New York State:
Westhall bill on motor vehicle traffic, 452.
—Washington, D. C.:
Uniform specifications discussed, 744.

Mount Vernon, N. Y.:
—Westchester Bus Co.:
Bus installation, 866.

Municipal Railway of San Francisco (See San Francisco, Cal.):

Muskegon, Mich.:
—Muskegon Traction & Lighting Co.:
Offer to purchase, 684.
Must have increase to continue, 179.
To abandon operation, 222.

N

Nashville, Tenn.:
—Nashville Railway & Light Co.:
Bus service expanded, 375.
Disputes commission valuation, 493.
Safety prizes, 31.
Street traffic regulation, 488.
Valuation, 181.
—Tennessee Transportation Co.:
Fare reduction, 260.

Newark, N. J.:
—Public Service Co-ordinated Transit:
Big chartered bus business, 865.
Bus order, 417.
Bus substatition in New Brunswick, 616.
Chartered bus service, *1048.
Extends bus lines near Dover, 744.
Fare increase for casual rider, 1138.
Largest chartered bus order, 808.
Morris canal right of way, 449.
288 new motor coaches, 381.
Prizes for safe operation.
Stock issue approved, 302.
Utility Commissioners' annual report, 141.
Wage agreement renewed, 943.
Wildcat competition, 299.
—Public Service Corporation:
Fares collected, 558.
Improvements announced, 226.

New Bedford, Mass.:
—Union Street Ry.:
High speed schedule, *475.

New England Street Railway Club:
—Modern light weight equipment discussed [Shram], 16.
—Meeting at Providence:
Needs of industry discussed, 365.

New Haven, Conn.:
—Connecticut Co.:
Bus maintenance, *789.
Bus substitution, 375.
Bus tax, 34.
Tucker Grant tax paid, 341.

New Jersey, State of:
—Commission for North Jersey Proposed, 553.

New Orleans, La.:
—New Orleans Public Service, Inc.:
Eighth week of strike, 861.
Strike comments by Father Wynhoven, 1078.

New Orleans, La.:
——New Orleans Public Service, Inc.. (Continued):
Strike settlement rejected, 942.
Strike status, 805.
Testing insulation of armatures [Naguin], *548.
Track maintenance cost [Mau], *527.
Trolley troughs [Engelhardt], *285.
Wage arbitration, 486.
—Orleans-Kenner Traction Co.:
Discontinuance of line proposed, 341.

Newport News, Va.:
—Virginia Public Service Co.:
Buses to be tried, 452.
Skip stop proposed, 298.

Newtonville, Mass.:
—Middlesex & Boston Street Ry.:
Bus substitution, 683.

New York Central R.R.:
—Journal Bearings Milled in a Drill Press [Bullock], *549.

New York City:
—Citizens' Street Traffic Committee Recommends Taxicab Regulation, 808.
—New subway:
Bids for equipment opened, 872.
Cars and equipment, 1024.
Power to be purchased, 553.
Track construction [Jacobs], *203.
Interest Rate, 613.
—Proposed subway work, 39.
—Far Rockaway, N. Y.:
Railway company dissolved, 35.
—Rapid Transit:
Bronx Concourse subway, 344.
—Rapid Transit stock:
City gets premium, 684.
—Street traffic congestion, 137.
—Subway's equipment contracts let, 1089.
—Taxicab service denied permit, 945.
—Transit Commission hearing on traffic rules, 807.
—Transit policy produces congestion [Address by Turner], 371.
—Transportation facilities, future requirements of metropolitan district, *696.
—Brooklyn City R.R.:
Band in safety work, 23.
Broach for valve seats, *129.
Flange bearing expansion joint [Merker], *848.
Operating revenue, 35, 182.
Roller sign holder [Watkin], *548.
—Brooklyn-Manhattan Transit Corp.:
Inspection shop [Squier], *273.
Merger with B. O. R.R., 262, 492.
New cars, 226.
New cars to be bought, 266.
Operating statement, 376, 412.
Ordered by commission to buy cars, 743.
Painting of elevated structure, 1024.
Shoppers use public transportation, 1122.
Testing friction tape [McKelway], 736.
Turnstile in car, *267.
Track materials [Jacobs], *325.
—Brooklyn & Queens Transit Corp.:
New cars purchased, 942.
Personnel, 869.
Turnstile fare collector for street car, *1137.
—Eighth & Ninth Avenues Ry.:
Bus substitution asked, 491.
Fare increase denied, 742.
In Supreme Court for fare increase, 945.
—Equitable Coach Co.:
Banks fear terms of grant, 410.
Bus grant, 490.
Certificate denied, 555.
Franchise, 218.
Franchise—to lapse, 374.
Merger, 142.
—Hudson & Manhattan R.R.:
Fire in roadbed, 333.
—Interborough Rapid Transit Co.:
Legal fees, 490.
7-cent fare case, 139.
25th anniversary, 807.
Fare case, 864.
—Jamaica Central Rys.:
Increase of capital stock, 376.
—Long Island R.R.:
Interlocking doors and power, comments, 191.
—Manhattan Bridge Three-Cent Line.:
Bought by city, 493.
City to purchase line, 102.
—Manhattan & Queens Traction Co.:
Receivership ended, 685.
—New York & Queens County Ry.:
Advertising, 743.
Armature winder's tool and material stand, *1133.
Fused portable lamp bank, *444.
Jig for drilling field terminals, *484.
Objects to competitive buses, 744.
Riveting controller finger tips, *736.
Special welding stand for compressor armatures, *849.

New York City (Continued):
—New York Railways:
Delays by traffic signals, *386.
—New York, Westchester & Boston Ry.:
Asks to acquire bus line, 808.
—Ocean Electric Ry.:
Scrapped, 455.
To resume, 493.
—Richmond Rys., Inc.:
Advertising, 336.
Reservoir drain valve, *736.
Air compressor bearings reamed, *403.
Air compressor commutator nut wrench, *801.
Commutator slotting hand saw, *445.
Grinder shield, *214.
Lubrication of motormen's valves, 25.
Special wrenches, *293.
Tool cabinet, *252.
Wheel grinder, *331.
—Second Avenue R.R.:
Reorganization, 411, 455.
—Staten Island Rapid Transit Ry.:
Babbitt mold, *402.
Chuck for expanding key washers, *484.
Hand truck for transporting wheels, *1131.
Journal polishing tool, *368.
Labor saving tools, *171.
Pit oven—portable, *293.
Pneumatic waste press, *331.
Storage methods, *213.
Truck for welding equipment, *849.
—Third Avenue Ry.:
Bond interest, 376.
Fare increase case on subsidiary line, 679.
Hand truck for bus engines, *852.
Jig for drilling pistons, *1132.
Overhaul pits covered by grating, *737.
Rate for school children, 98.
Reclaiming steel tubular span wire poles, *854.
Tow rope with spring, *368.
Trackless trolley considered, 690.
—Van Brunt St. & Erie Basin R.R.:
Service ordered 30 days, 302.

New York Electric Railway Association:
—Meeting at Bluff Point, N. Y., 700.
—Midwinter meeting in New York:
Subjects for discussion, 140.
—Midwinter meeting in New York, 170.

New York, New Haven & Hartford R.R.:
—Finance for New England Transportation Co., 260.
—Power purchasing:
Advantages and disadvantages [Brown], c591.

New York State Railways:
——Substitution of bus for trolley sought, 1144.

New York, State of:
—Electrification:
Extension of time, 490.
—Legislature:
Bills passed, 555.
—Motor bus regulation:
Annual report of Public Service Commission, 451.
—New York Transit Commission:
Steel cars on elevated barred, 227.
—Paving bill in legislature, 337.
—Public Service Commission wants more power, 337.
—Thayer Bill gives commission control of motor buses, 559.
—Unification legislation, 297.
—Unification bill:
I.R.T. opposes bill, 449.

Noise reduction:
—Detroit, Mich.:
Reducing noise of car operation [Williams], *513.
—Worn gears:
Fit improved [Sawtelle], *660.

Norfolk, Va.:
—Virginia Electric & Power Co.:
Assorted layout of track materials [Newman], *1135.
Bus engines—limbering up [Hall], *403.
Cylinder boring machine [Hall], *330.
Double-gage crossover [Hall], *610.
Fare box lights [Hall], *25.
High pressure greasing of trucks [Hall], *676.
Oil reclaiming [Hall], *214.
Pole rack [Hall], *737.
Pull-ins charged to men [Hall], *733.
Stationary track department crane [Hall], *853.
Trolley pan at drawbridge, *128.
Unloading trestle for material handling [Hall], *551.
—Virginian Railway:
Electrification plans, 806.

Northampton, Mass.:
—Northampton Street Ry.:
Buses to Pittsfield, 683.

Northern Ohio Power & Light Co. (See Akron, Ohio):

Northern Texas Traction Co. (See Fort Worth, Texas):

O

Oakland, Cal.:
—Key System Transit Co.:
Asks for discontinuance of line, 746.
Asked to substitute buses in Alameda, 808.
Bus line abandoned, 300.
Cars burned, 296.
Reorganization plans, 745.
Reorganization plan, 810.

Oak Park, Ill.:
—Chicago and West Towns Ry.:
Bond sales, 143.

Ogdensburg, N. Y.:
—Ogdensburg Street Ry.:
Legal controversy with city, 35.

Ogden, Utah:
—Utah-Idaho Central R.R.:
Receivership lifted, 453.

Oklahoma City, Okla.:
—Oklahoma Ry.:
Purchase of Oklahoma Belt Ry., 455.
Recent rapid development, *725.

Oklahoma Utilities Association:
—Finance discussion, 298.

Omaha, Neb.:
—Omaha & Council Bluffs Street Ry.:
Bridge vote to be held in spring, 1139
Budget for improvements, 416.
Bus line extensions sought, 375.
Mandrel for machining axle bearings [McGill], *1132.
Negotiations for sale of bridge to city, 1078.
Painting screens [Patison], *735.
Safety campaign, 806.
Seat practice, *213.
Special tools speed up heater installation [Reeves], *851.
Stockholders meeting, 377.
Warm cars attract fares, 259.

Operating records and costs:
—American Electric Railway Assn'n statistics, 35.
—Baltimore, Md.:
Operating statement, 809.
U. R. & E. Co., 376.
—Boston, Mass.:
Boston Elevated operating statement, 809, 945.
—British Tramways:
Operating statements, 645.
—Canadian Electric Railway Ass'n.
Show gain by Canadian properties, *1049.
—Cape Town, South Africa, 32.
—Comments on 1928, 107.
—Denver, Col.
Operating net improved, 221.
—Eighty electric railways:
Annual reports, 641.
Comments on, 629.
—Expenditures for materials and plant by electric railway industry, *46.
—Fare wage, cost statistics, *91.
—Georgia Power Co. statement, 103.
—Net earnings:
Effect of new cars [Buck], *583, *653.
—New South Wales, Australia, 32.
—Ottawa, Ont.:
Ottawa Electric Ry. fare reduction, 373.
—Show stability of electric railways, 592.
—Tacoma, Wash.:
Municipal Belt Line, 746.
—Taxicab competition:
Cut rates serious menace [Brown], 784.
—Thirty-one railways, 709.
—Various electric railways:
Operating statements, 772, 847, 944, 1023, 1076.
—Various railway companies:
Operating statements, 1128.
—Youngstown Municipal Railway, 142.

Ottawa, Can.:
—Ottawa Electric Ry.:
Earnings insufficient, 302.

Overhead contact system:
—Westinghouse El. & Mfg. Co.:
Renewable pan trolley frog, *1137.

P

Pacific Electric Ry. See Los Angeles, Cal.):

Pacific Gas & Electric Co. (See Sacramento, Cal.):

Pacific Northwest Traction Co. (See Seattle, Wash.):

Palo Alto, Cal.:
—Peninsular Ry.:
Discontinuance of line, 1025.

Paris, France (See France):

Parking of cars:
—A.E.R.A. Bulletin, 450.

Baltimore, Md.:
Ordinance, 557.
Parking regulation needs shown by fire. Comments on, 568.
Parking restrictions help railway, 616.
Serious menace, 371.

—Chicago:
"No Parking" ordinance enforced, 1079.
Parking elimination [Gordon], *312.
Parking ordinance, 555.

—Detroit, Mich.:
Aids flow of traffic [Gould], *1119.
Enforcement of regulations. Comments on, 1092.

—5th Avenue Customers:
One per cent are parkers, 660.

—Memphis, Tenn.:
Parking being considered, 1079.

—New York:
Parking restrictions on 50 streets, 806.

—Results of Elimination: Comments on, 819.

—St. Louis, Mo.:
Merchants want restrictions, 297.
Elimination of all parking, 742.
Parking elimination speeds cars, 409.
Parking ban successful, 680.

Pavements:
—Changing traffic conditions affect paving practices, *1108.

—Obligations of Buses in re Highways, 102.

—Sioux Falls, S. D.:
Traction company to pave, 555.

—Survey of paving trend. Comments on, 1093.

Paving relief (See Taxes):

Pennsylvania-Ohio Electric Co. (See Youngstown, Ohio):

Pennsylvania Public Service Information Committee:
—Discontinued, 450.

Pennsylvania R.R.:
—Coordination with P. R. T. Long Distance Lines, 179.

—Electrification, *67, 487.

—Electrification at Baltimore, 409.
Extension of program, *433.
New York to Washington, 1077.

—Washington, D. C.:
Interstate bus operation, 491.

Pennsylvania, State of:
—Legislature:
Paving relief bill, 406.

Peoples Ry. (See Dayton, Ohio):

Petersburg, Va.:
—Petersburg, Hopewell & City Point Electric Ry.:
Road sold, 685.
Acquisition negotiations, 412.

Philadelphia, Pa.:
—City retains Milo R. Maltbie in P. R. T. audit, 554.

—Philadelphia Rapid Transit Board, 555.

—Public Service Commission:
Hearing on cab company's application, 864.

—Purchase by city of underlying companies, 296.

—Subway:
Electrical equipment, *395.
Description of shops and yards, *465.

—Subway cars:
Design, *319.

—Subway system, *241.

—Mitten Tours, Inc.:
Coordination of P. R. R., B. & O. and Mitten, 558.
Use scientific advertising [Keenan], *587.

—Philadelphia Rapid Transit Co.:
Accounting questioned by city, 745.
Changes on board, 561.
Condemnation of underlying companies, 448.
Dispatching by loud speaker, *1063.
Dividend action criticized, 810.
Dividend dispute ended, paid, 868.
Fare collection, 297.
Fuel oil for buses [Queeney], *165.
Mitten tours expand, 491.
New corps of transportation supervisors, *15.
Offers aid in traffic problem, 98.
Paying old claims, 488.
Pedestrians dominate traffic problem, *838.
Public relations, 425.
Purchase of underlying companies by city, 412.
Sought control of Philadelphia Electric Co. says Maltbie, 1083.

Phoenix, Ariz.:
—Phoenix Municipal Ry.:
Rehabilitation, 307.

Piqua, O.:
—Dayton & Troy Traction Co.:
Not to abandon, 455.

Pittsburgh, Pa.:
—Pittsburgh Rys.:
Experimental cars. Comments on, 694.
Duquesne wants contract similar to Pittsburgh's, 1024.
Light car design, *712.
Medals for safe driving, 614.
Pneumatic jig for truck assembly [Devers], *675.

—Subway:
Against hasty action, 742.

—West Penn Railways:
Aluminum protector for window sill at McKeesport [Hall], *1130.

Pittsfield, Mass.:
—Berkshire Street Ry.:
Bus substitution granted in Vermont, 866.
Seeks bus substitution, 866.
Seeks new bus lines in North Adamas, 1082.

Plattsburgh, N. Y.:
—Plattsburgh Traction Co.:
Discontinuance of line, 868.

Pontiac, Mich.:
—Eastern Michigan Railways:
Steel ties, *283.

Port Chester, N. Y.:
New York & Stamford Ry.:
Bus substitution, 744.

Portland, Me.:
—Cumberland County Power & Light Co.:
Armature winding stand [Chiles], *402.

Portland, Ore.:
—City Planning Commission suggests moving lines, 682.

—Oregon Electric Ry.:
Property purchase, 682.

—Portland Electric Power Co.:
Accident record, 1078.
Fare increase needed, 373.
Fare increase indorsed by labor, 682.
Fare increase hearing, 944.
Fares reduced, 219.
Seeks fare increase, 613.
Twenty year club, 258.

Poughkeepsie, N. Y.:
—Poughkeepsie & Wappinger Falls Ry.:
Pays paving debt, 177.

Power distribution:
—Double trolley in Germany, *156.

—Knoxville, Tenn.:
Automatic substations, 226.

—Single-phase railway system reviewed [Westinghouse], 626.

—Supervision in Chicago, *207.

—Trolley pan at drawbridge, *128.

—Trolley frog, *127.

Power generation:
—Steam:
Possibilities undeveloped. Comments on, 349.

Power stations and equipment:
—C. H. & D. Ry. [Rose], *357.

Princeton, Ill.:
—Chicago & Illinois Ry.:
Abandonment hearing, 494.

Providence, R. I.:
—United Electric Rys.:
Bus substitution, 616.
Cruising taxis, 409.
Loss in revenue, 143.
New working agreement, 863.
One-man service necessary, 334.
Operating statement, 618.
Scraps cars, 946.
Wage controversy, 681.

Publicity (See also Advertising):

Public Relations with:
—Civic Activities. Comments on, 461.

—Comments, 231.

—Confidence needed [Cummings], *917.

—Florida Public Utility Information Bureau: Comments on, 501.

—Philadelphia, Pa.:
P. R. T. publicity, 425.

—Publicity:
Public fair if properly informed [Wilkie], *961.

—Springfield, Mass.:
Public good will. Comments on, 347.

—St. Louis:
Publishes pamphlet for riders, 333.
"Transit News" on cars, 409.

Public service and regulative commissions:
—Chicago, Ill.:
Bus order reversed, 339.

—Hartford, Conn.:
Taxicabs now common carriers, 807.

—Indiana, State of:
O'Fallon ruling observed by Indiana Commission, 867.

—Interstate Commerce Commission:
Ruling on railroad bus subsidiaries, 558.

Public service and regulative commissions (Continued):
—Michigan Public Utilities Commission:
Test case, 339.

—Motor vehicle regulation demands attention [Barber], *965.

—Newark, N. J.:
Morris canal right-of-way approved, 449.

—New Jersey, N. J.:
Commission for North Jersey proposed, 553.

—New Orleans, La.:
Paying of old claims, 488.

—New York:
Commission sees need of bus regulation, 451.
Transit Commission ruling on legal fees, 490.

—Ohio, State of:
Flasher lights at railroad crossings, 943.

—Philadelphia:
Condemnation of underlying companies of P. R. T., 448.

—Regulation Basis:
Comments on, 757.

—Regulation of Vehicles:
Taxicab regulation. Comments on, 421.

—Rochester, N. Y.:
Fare increase, 102.

—Taxicab Regulation:
Needed for stabilization [Gilman], *897.

—Texas:
Legislation for, 297.

—Washington, D. C.:
Vacancies to be filled, 488.

Public Service Coordinated Transport (See Newark, N. J.):

Public Service Corporation (See Newark, N. J.):

Public Service Ry. (See Newark, N. J.):

Public Service Transportation Co. (See Newark, N. J.):

Puget Sound Power & Light Co. (See Seattle, Wash.):

R

Rails:
—Fatigue of metals [Ewing], *775.

Railway construction proposed:
—Milwaukee, Wis.:
Grade crossing elimination, 39.

—New York, N. Y.:
Subway bids asked for, 39.

Railways (General):
—Community transportation an unrecognized major element in prosperity, 627.

—Construction and equipment orders, 146.

—Development of Transportation:
The will to win. Comments on, 755.

—Developments of 1928, 41.

—Economic conditions:
Stock market crash not serious to railways, 1091.

—Stability of industry, *43.

—Subway mileage, 70.

—Trade outlook for 1929, *94.

—Younger men sought, 150.

—Executive's view of future:

Rapid transit:
—Boston, Mass.:
Speeds of subway cars, 1060.

—Detroit, Mich.:
Proposes extensive subway, 804.
Proposes subways, 138.
To vote on plans for subway, 333.

—Milwaukee, Wis.:
Rapid transit lines pushed, 407.

—New York City:
Criticism of New York policy by Daniel L. Turner. Comments on, 348.
Large subway expenditures, 306.

—Philadelphia subways:
Comments on, 270.
Description, *241, *465.
Electrical equipment, *395.

—Relation to community development [Hallihan], *910.

—Rochester, N. Y.:
Erie Canal now subway, *423.

—Seattle studies Rapid Transit, 136.

—St. Louis, Mo.:
Traffic does not warrant, 1141.

—Subways cost [Kelker], 239.

Reading, Pa.:
—Reading Transit Co.:
Operating statement, 221.

—Reading R.R.:
Electrification, *67, 682.

Repair shop practice† (See Maintenance practice):

Repair shops and equipment:
—Electrical test board, *132.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Abbreviations: *Illustrated. c Communications.

Repair Shops and Equipment (Continued):
—Floor installation, *116.
—Grand Rapids, Mich.:
Field coil tester [Lunda], *24.

Reports, Financial (See Financial reports):

Revere, Mass.:
—City proposes bus operation:
Complaint against railway, 410.

Richmond, Va.:
—Virginia Electric & Power Co.:
Bus substitution, 807, 1082.
Extensive repavement, *1089.
Golden Jubilee of Light observed, 1080.
Overhauling brake rigging, *131.
Produces film "For the Old Dominion," 681.

Roanoke, Va.:
—Roanoke Railway & Electric Co.:
Experimental color scheme for cars, 807.
Selling transportation, 488.

Rochester, N. Y.:
—Rochester Engineering Society:
Traffic study shows street car value, *1036.
—Subway:
Erie Canal now subway, *423.
—New York State Rys.:
Ask bus substitution, 808.
Bus line changes, 1082.
Fare increase, 101.
Jitney competition, 339, 374.
Loss in revenues, 143.
Operating record, 341.
Platforms and shelters, *163.
—Rochester Railways Co-Ordinated Bus Lines, Inc.:
Fare increase, 102.

Rochester & Syracuse R.R. (See Syracuse, N. Y.):

Rock Island, Ill.:
—Tri City Railway:
Buses supplant cars, 300.

Rushville, Ind.:
—Indianapolis & Southeastern Ry.:
Bonus for courtesy, 258.

S

Sacramento, Cal.:
—Pacific Gas & Electric Co.:
Bus franchise sought, 34.
Bus substitution denied, 339.
Bus certificate asked for, 300.
—Sacramento Northern Ry.:
Acquires Sacramento short line, 103.

Safety work:
—Safety for Employees, Comments on, 1092.

St. John, N. B.:
—New Brunswick Power Co.:
Newspapers sold on cars, *516.

St. Joseph, Mo.:
—St. Joseph Railway, Light, Heat & Power Co.:
Bus substitution, 491.

St. Louis, Mo.:
—Accident Prevention:
Courteous drivers club, 559.
—Parking of Cars:
Elimination of all parking, 742.
Restrictions wanted, 297.
—Rapid Transit:
Bill in Legislature, 337.
—Terminable permit bill vetoed, 740.
—Transportation Survey Commission:
Consideration of contract ordinance, 867.
Traffic study, 615.
—International Utilities Co.:
Buy Hertz bus interests in St. Louis, 489.
—Missouri Electric R.R.:
Taken over by St. Louis Public Service, 142.
—St. Louis Electric Terminal Ry.:
Subway to be built, 344.
Terminal developments, 692.
Vacation of street for subway, 743.
—St. Louis Public Service Co.:
Bus substitution, 339.
City Utilities Co. owns 38 per cent of voting stock, 943.
Depreciation accounting, 810.
Discontinuance of service, 374.
Fare increase expected, 860.
Fares collected on cars and buses, 746.
Fare increase, 942.
Fare reduction threatened, 373.
Hood for sign painting, *445.
Last open bench car burned, 807.
New bus service competition, 452.
Newspaper advertising, 99.
Operating statement, 618.
Parking elimination, 409.
Publishes paper for riders, 333.
Schedules, 681.
Stock ownership questioned, 143.
Tax paid in stock, 340.
"Transit News" on cars, 409.

St. Louis, Mo.:
—St. Louis Public Service Co. (Continued):
"Transit News" against parking, 743.
Valuation argued, 262.
Valuation contest, 492.
Wage controversy, 863.
Wages not enough to buy new uniforms, 336.
Wage controversy, 613.

St. Paul, Minn.:
—Bus line extension, 260.
—St. Paul City Ry.:
Fare increase, 257, 295.

St. Paul City Ry. (See Minneapolis, Minn.):
—Twin City Rapid Transit Co.:
Fare increase, 175.
Lantern maintenance [Spencer], 214.
Trolley frog, *127.

St. Petersburg, Fla.:
—St. Petersburg Municipal Ry.:
Clamping arrangement keeps controller handle basis tight [Marsh], *444.
Jig for machining bus connecting rods [Marsh], *1133.
Oilers for car trucks [Marsh], *253.
Preventing loose armature bands [Marsh], *549.
Rebabbitting connecting rods for bus engines [Marsh], *607.

Salt Lake City, Utah:
—Bamburger Electric Railroad:
Key for axle bearing, *131.
—Utah Light & Traction Co.:
Trackless trolley [Heiges], *232.
Trackless trolley questions, *705.
Ventilation for paint spraying, *483.
—Utah Power & Light Co.:
Employees welfare, 236.
Newspaper advertising, *407.

San Antonio, Texas:
—San Antonio Public Service Co.:
Electrical track switch safety device [Botto], *24.
Repairing manganese wear plates [Botto], *551.
Tamping pads [Botto], *287.

San Diego, Cal.:
—San Diego Electric Ry.:
Armature bearing shell expanding broach [Herms], *1131.
Axle tongs [Herms], *402.
Bus line extension, 559.
Brush pressure adjustment [Clegg], *544.
Chuck and jig for axle bearings [Herms], *24.
Chuck for armature bearings [Herms], *288.
Cotter key extractor [Tipton], *132.
Coupler contact block repairs [Herms], *330.
Equipment test board [Clegg], *800.
Improved switch for flashlights [Tipton], *851.
Jig for dowel pin holes [Herms], *484.
Key seats for armatures [Herms], *213.
Locomotive striped for safety [Tipton], *710.
Maintenance prize award stimulates performance [Mason], c1065.
Mandrel for turning brake drums [Herms], *674.
Operating statement, 561.
Piston ring compressor [Herms], *129.
Radiator filling station [Clegg], *286.
Repairing brake cams [Herms], *253.
Track switch coil cylinder vise [Herms], *550.

San Francisco, Cal.:
—Report of City Engineer:
Recommends unification, 741.
Subsidy by general taxation unsound, 695.
—Transit Policy:
Recommended by city engineer, Comments on, 695.
—California Street Cable R.R.:
City offers to buy, 181.
City plans to operate, 334.
—Market Street Ry.:
Financial condition good, 1024.
Valuation, 617.
Valuation by city engineer, 741.
—Municipal Ry.:
Bus lines deficit, 300.
—Northwestern Pacific R.R.:
Car design, 417.
—Southern Pacific Co.:
Seven cent fare trial, 338.
—Twin Peaks Tunnel:
Rapid transit development by benefit assessment [O'Shaughnessy], *1094.
Rapid transit development by benefit assessment, Comments on, 1093.

Santa Barbara, Cal.:
—Santa Barbara & Suburban Ry.:
Discontinuance of line, 561.

Savannah, Ga.:
—Savannah Electric & Power Co.:
Bus substitution, 683.

Schedules and time tables:
—Atlanta, Ga.:
Rerouting of cars, 615.
—Higher schedule speeds needed, 230.
—High speed [Woods], *237.
—Kansas City, Mo.:
High speed service, 804.
Limited stop plan speeds cars [Fennell], *1055.
Skip stop, 407.
—New Bedford, Mass.:
Higher speeds effective, *475.
—Newport News, Va.:
Skip stops proposed, 298.
—St. Louis, Mo.:
Traffic study, 615.
Special service, 681.
—Schedule Speeds:
Comments on, 757.
—Skip Stop Plan:
Higher speeds attained, Comments on, 1031.
—Spokane, Wash.:
Car lines numbered, 557.
—Toledo, O.:
Rerouting, 102.

Scotland (See Great Britain):

Seattle, Wash.:
—Taxicab franchise, 220, 260.
—Traffic research commission, 149.
—Puget Sound Electric Co.:
Abandons line, 102.
Sale of interurban line, 560.
—Puget Sound Power & Light Co.:
Bid for Seattle-Tacoma interurban right of way, 412.
Increased capitalization of subsidiary, 143.
Purchase by city, 1024.
Purchase of property by city, 222.
Rapid transit negotiations, 136.
350 miles of route, 865.
—Seattle Municipal Ry.:
Attempt to refinance, 740.
Commission to operate, 451.
Fares for school children, 681.
Inspection for trainmen, 743.
Line abandonment asked, 682.
Loan of funds legal, 340.
Old employees favored, 99.
Refunding desired, 618.
Rerouting of service, 1025.
Service curtailed, 29.
Suit dismissed, 372.
Tax to assist railway department, 334.

Sedalia, Mo.:
—City Light & Traction Co.:
Bus substitution, 410.

Shore Line Motor Coach Co. (See Gary, Ind.):

Shreveport, La.:
—Shreveport Railways:
One man operation, 450.

Sioux City, Ia.:
—Sioux City Service Co.:
Fare increase, 259, 488.

Sioux Falls, S. D.:
—Sioux Falls Traction Co.:
Paving of tracks, 555.

Snow and ice removal:
—Heavy snows in South, 449.
—Montreal, Que.:
No parking after snow storms, *437.

Society of Automotive Engineers:
—Meeting at Toronto:
Bus development, 1129.

South Africa:
—Cape Town:
Operating report, 32.

South Bend, Ind.:
—Chicago, South Bend & Northern Indiana Ry.:
Discontinuance of bus lines asked, 683.
Reorganization plan, 1083.

South Carolina Power Co. (See Charleston, S. C.):

Southwest Missouri R.R. (See Joplin, Mo.):

Southern Indiana Gas & Electric Co. (See Evansville, Ind.):

Southern Ohio Public Service Co. (See Zanesville, Ohio):

Southern Public Utilities (See Charlotte, N. C.):

Southwestern Public Service Association:
—Meeting at Dallas, Tex., 741.

Spain:
—Electrification, 460.
—Improvements, $600,000,000, 346.
—New electric railway, 338.

Spartanburg, S. C.:
—South Carolina Gas & Electric Co.:
Sold, 35.

Special trackwork:
—Brooklyn, N. Y.:
Expansion joint with flange bearing [Merker], *848.

Special trackwork (Continued):
—Cleveland, Ohio:
Portable crossovers [Davidson], *252.
—San Antonio, Tex.:
Switch safety device [Botto], *24.
—Silico manganese [Richardson], *254.
—Specification for Material, Comments on, 270.
—Specifications approved, 318.
—Spring Switch:
Oil buffer prevents slopping [Underwood], *836.

Spokane, Wash.:
—Spokane United Railways:
Car lines numbered, 557.
Sells Notatorium Park, 618.

Springfield, Ill.:
—Illinois Power Co.:
Budget for improvements, 416.
Stockholders vote stock increase, 455.

Springfield, Mass.:
—Eastern States Exposition Exhibits, 1025.
—Taxicabs:
Flat rates abolished, 559.
—Springfield Street Ry.:
Flat rate taxi opposed, 375.
Loss in passengers, 143.
Mayor commends railway, 297.
Merchandising transportation, 1082.
Charging losses account of dismantling lines, 32.
—Springfield Street Ry.:
Public good will, Comments on, 347.
Report on revenue, 746.

Springfield, Ohio:
—Bids to furnish transportation, 258.
—Indiana, Columbus & Eastern Traction Co.:
Aluminum cell lightning arrester [Foote], 292.
Good will messenger, 219.
Offered at receivers' sale, 1083.
Safety committee results, 559.
Vacuum cleaner for seats, *130.
—Springfield Railway:
C. H. & D. plans to acquire Springfield Ry., 371.
Reorganization, 182.

Stark Electric R.R. (See Alliance, Ohio):

Statistics:
—Bus operations growth, 71.
—Canadian Electric Ry. Assn.:
Shows revenue gain in Canada, *1049.
—Cars purchased, 1928, *78.
—Construction, reconstruction, electrification, 1928, *63.
—Electric railway statistics show stability, 592.
—Electrification of steam roads, *67.
—European Practice:
Ratio of railways and buses, 474.
—Riding habit trend in 23 cities, 1033.
—Rochester Engineering Society:
Traffic study shows street car importance, *1036.
—Subway mileage, 70.
—Financial reports (See Financial reports):
—Expenditures for materials and plant, *46.
—Financial status 1928, *85.

Stores:
—Engineering aspects of purchasing [Crain], *986.

Storm and Fire Damage:
—Birmingham, Ala.:
Damage slight, 488.
—Staten Island:
Staten Island Rapid Transit fire, 945.

Street traffic congestion (See also Parking of cars):
—Atlanta, Ga.:
Georgia Power Co. prize for traffic solution, 806.
—Cause of [McIlraith], *630.
—Comments on, 108.
—Detroit, Mich.:
Enforcement of traffic regulation aids flow of traffic, *1119.
—Elevated Highways, Comments on, 2.
—Fifth Avenue Business District:
Ratio of customers by auto, Comments on, 627.
—Houston, Tex.:
Traffic study, 679.
—New York City:
Commercial vehicles, Comments on, 347.
Compared with other cities, 229.
Theatre district, 137, 174.
Street cars delayed by traffic signals, *386.
Traffic regulation, Comments on, 149.
—Philadelphia:
Traffic problem and the pedestrian, *838.
—Wisconsin vehicle code, 337.

Strikes and arbitrations:
—New Orleans, La.:
Eighth week of strike, 861.
Service being restored, 805.

Strikes and arbitrations:
—New Orleans, La. (Continued):
Strike comments by Father Wynhoven, 1078.
Strike settlement rejected, 942.
—Staten Island, N. Y.:
Tompkins Bus Corp. wins strike, 946.

Substations and equipment:
—Milwaukee, Wis.:
Mercury arc rectifiers, *471.
Substation operators, *360.
—Montreal, Que.:
Mercury arc rectifiers [de Angelis], *778.

Superior, Wis.:
—Duluth St. Ry.:
Fare increase hearing, 258.

Switzerland:
—Electric operation profitable, 777.
—Simplon tunnel electrification, 1081.

T

Tacoma, Wash.:
—Mayor resigns, 407.
—Tacoma Municipal Belt Line:
Operating statement, 746.
—Tacoma Railway & Power Co.:
Rehabilitation, 489.

Tampa, Fla.:
Tampa Electric Co.:
Accidents reduced, *161.
Brady class B award, *5.
Operating records, 222.
Wins Brady Medal, 97.

Taunton, Mass.:
East Taunton Street Railway:
Asks bus certificate, 558.

Taxes:
—A.E.R.A. Committee, 298.
—Baltimore, Md.:
United Railways and Electric Co. park taxes, 807.
—Comments on taxation, 231.
—Detroit, Mich.:
Government seeks back taxes from Detroit United Railway, 746.
—Illinois, State of:
Gas tax, 491, 557.
—Ohio, State of:
Bus tax relief for railways, 409.
—Paving Tax Bill:
Pennsylvania legislature, 406.
—Tax Burden Relief:
Concentrated effort needed [Geisse], *901.
—Unproductive transportation charges, comments on, 347.

Tennessee Electric Power Co. (See Chattanooga, Tenn.)

Terminals and waiting stations:
—Cleveland Terminal Project [Faust], *576.
—London, Eng.:
New station at Piccadilly Circus, *439.
Station signs, *389.
—Station Announcer:
Power amplifier by Radio Receptor Co., *1075.

Texas Electric Ry. (See Dallas, Texas.)

Texas, State of:
—Legislature:
Commission measure fails, 681.

Third Avenue Ry. (See New York City.)

Ties:
—Chicago, Ill.:
Old ties retained, *253.
—Pontiac, Mich.:
Steel ties, *283.
—Requirements of electric railways [George], 603.

Toledo, Ohio:
—Community Traction Co.:
Co-ordinated service development, *701.
Earnings, 809.
Franchise agreement, comments on, 694.
High school buses pay, 492.
Operating record, 377.
Operating statement, 494.
Reorganizes transportation service, *978.
Rerouting Plan, 102, 806.
Special service for women workers on night shift, 681.
Wage advance, 804.

Toronto, Ont.:
—Railways dominate bus field, 616.
—Toronto Transportation Commission:
Accurate garage records [McArthur], *531.
Boro collectors, *833.
Bus service expanded, 558.
Discontinuance controversy, 864.
Expansion joint for grooved rail [Kinnear], *543.
Maintenance of electric track switches [McAdam], *1052.

Toronto, Ont.:
—Toronto Transportation Commission (Continued):
New cars contemplated, 692.
New service, 30.
Proposed investigation, 1025.
Rail clips for emergency repairs [Drowley], *607.
Repairing manganese track castings [Fennell], *608.
Theft of light bulbs, 863.
Track switch box support [McCallum], *609.
Wage arbitration, 553.

Track Construction:
—Budgets:
Comments on, 269.
—Cleveland, O.:
Concrete duct for track switch wires [Brown], 1054.
Importance of details [George], *824.
Rapid work [George], *509.
Track ballast spread with grader [George], *1042.
—Detroit, Mich.:
Cost analysis of track construction [Nolan], 665.
—Fatigue in concrete [Ewing], *829.
—Michigan City, Ind. [Hubenthal], *392.
—Montreal, Que., *250.
—New York:
Subways [Jacobs], *203.
Subway track materials [Jacobs], *325.
—Pavement:
Changing traffic conditions affect paving practices, *1108.
In track area, 1054.
Survey of paving trend, Comments on, 1093.
—Statistics for 1928, *63.
—Track in paving:
Sealing track important [Harvey], *987.

Trackless Trolley:
—Japan, 777.
—Salt Lake City, Utah [West], *705.

Track maintenance:
—Derrick car, *127.
—Paving in tracks:
Partial relief in Iowa, 615.
—Suggestions for improvements, 133.

Traffic investigations:
—5th Avenue customers:
One per cent are parkers, 660.
—Riding habit:
In nine large cities [Beeler Organization], *9.
In large cities, comments on, 1.

Traffic regulation:
—Boston, Mass.:
Regulation of taxicabs, 1024.
—California:
Motor vehicle regulations being formulated, 1082.
—Comments on, 229, 309.
—Kansas City, Mo.:
Traffic survey, 680.
—Louisville, Ky.:
Loading platforms requested by railway, 28.
—Nashville, Tenn.:
New restrictions, 488.
—New Jersey, Essex County traffic signals speed traffic [Simpson], *765.
—New York, N. Y.:
Theatrical district traffic, 943.
—Pedestrians:
Philadelphia traffic survey, comments on, 821.
—Signals should move traffic [Bibbins and Lummis], *570.
—Signals:
Trolley operated signals in Louisville, *835.
Delays, comments on, 384.
—U. S. Chamber of Commerce, 296.

Traffic stimulation:
—Boston, Mass.:
Dollar passes on Eastern Massachusetts, *837.
—Evansville, Ind.:
Excursion rates, 408.
Reduced rates, 554.
—Gary, Ind.:
Better service at lower fares on Gary railways [Wingerter], *1115.

Transportation, Metropolitan:
—Boston riding habit:
—Brooklyn, N. Y.:
Comments on, 820.
85% of shoppers use public transportation, 1122.
—Co-ordination of facilities:
Comments on, 820.
—City development [Bibbins], *893.
—Duplication of service:
Comments on, 462.
—"Horse Car Days," by Raymond L. Tompkins.
Comments on, 463.

Transporation, Metropolitan (Continued):
—New York City:
Bus substitution would not correct transportation troubles, 1091.
Future requirements of metropolitan district, *696.
Transit policy wrong [Turner], 370.
—Riding habit trend in 23 cities, 1033.
—Taxicabs:
Regulation needed [Gilman], *897.
—Transportation affects all business [Lamont], *973.
—Transportation facilities neded for New York and environs, comments on, 693.
—Unification necessary [McCarter], *959.

Tri-City Ry. of Illinois (See Rock Island, Ill.)

Tri-City Ry. of Iowa (See Davenport, Iowa)

Tulsa, Okla.:
—Oklahoma Union Ry.:
Wages and working agreements, 743.
—Tulsa Street Ry.:
Railway to be sold, 36.
Sold under foreclosure, 261.

Twin City Rapid Transit Co. (See Minneapolis, Minn.)

U

Union Street Ry. (See Bedford, Mass.)

United Corporation:
—Organized, by J. P. Morgan & Co., 100.

United Electric Rys. (See Providence, R. I.)

United Railways (See St. Louis, Mo.)

United Railways & Electric Co. (See Baltimore, Md.)

United States Chamber of Commerce:
—Meeting in Washington, 658.

United Suburban Ry. (See Grandville, Mich.)

United Traction Co. (See Albany, N. Y.)

Utah Light & Traction Co. (See Salt Lake City, Utah)

Utah, State of:
—Public Utilities Commission report, 494.

Utica, N. Y.:
—N. Y. State Railways:
Buses displace trolleys, 34.
—Utica Railway Co-ordinated Bus Line, Inc.:
Asks certificate for Rome, 452.

V

Valdosta, Ga.:
—Valdosta Street Ry.:
Discontinuance of line, 412.

Vancouver, B. C., Can.:
—British Columbia Electric Co.:
Cars painted on mileage basis, *605.
Fare decrease likely, 448.
Fare increase, 488.
Official pamphlet, "The Buzzer," 557.
Traffic holding up, 337.

Virginia, State of:
—Franchises:
Commission's authority, 220.

Virginia Electric & Power Co. (See Richmond, Va.)

W

Wages and working agreements:
—A.E.R.A. bulletins, 450.
—Atlanta, Ga.:
Georgia Power Co., 298.
—Boston, Mass.:
Eastern Massachusetts wage agreement, 372.
Wage controversy, 217.
—Cleveland, O.:
Wage controversy, 680.
—Davenport, Ia.:
Contract executed, 682.
—Des Moines, Ia.:
New wage agreement, 1077.
One-man car adopted at Des Moines, comments on, 1031.
One-man car proposal rejected by men, 860.
—Fare, wage, cost statistics, *91.
—Indianapolis, Ind.:
Hearing to be held, 337.
Wage demand, 556.
Wage increase, 373.
—Industrial relations:
Improved by electric railways [Vickers], 1043.
—London, Ont.:
Wage action halted, 555.
—Newark, N. J.:
Public service agreement renewed, 943.
—New Orleans, La.:
Arbitration, 486.
—Providence, R. I.:
New agreement with men, 863.
Wage controversy, 681.
—St. Louis, Mo.:
Wage not enough to pay for new uniforms, 336.
Wage controversy, 613.
—Toledo, O.:
Wage advance, 804.
—Tulsa, Okla.:
Strike ended, 743.
—Toronto, Ont.:
Wage arbitration, 553.

Wage decrease:
—Buffalo, N. Y.:
Buffalo & Erie in Court of Appeals, 295.

Wage increases:
—Illinois Terminal Railroad:
Illinois Traction wage increase, 178.
—York, Pa.:
York Railways, wage increase, 101.

Washington, Baltimore & Annapolis Electric R.R. (See Baltimore, Md.)

Washington, D. C.:
—A.E.R.A. office reorganized, 1122.
—Merger of railways:
Valuation not a factor, 103.
—Merger unlikely, 221.
—Merger of railways, 262.
—Public Service Commission:
Asks co-operation of interstate bus operators, 1082.
—Capital Traction Co.:
Fare case closed, 945.
Fare increase to be asked, 448.
Fare increase hearings, 1025.
Trainmen's meetings prevent accidents, 366.
—Washington Railway & Electric Co.:
Traffic declines, 261.
Fare increase appeal directed, 1139.
—Waterloo, Cedar Falls & Northern Ry.:
Bondholders Committee report, 336.
Operating statement, 561.

Webb City, Mo.:
—Southwest Missouri R.R.:
Fare increase in Joplin, 743.

West Penn Rys. (See Pittsburgh, Pa.):

Wheeling, W. Va.:
—Wheeling Traction Co.:
Fare increase suspended, 259.
Interstate Commerce Commission hearing on Ohio rates, 1077.
Rate hearing continued, 406.

White Plains, N. Y.:
—Westchester Street Transportation Company, Inc.:
Asks bus substitution, 865.

Wichita, Kan.:
—Wichita Railroad & Light Co.:
Valuation, 617.

Wilmington, N. C.:
—Tidewater Power Co.:
Brady class C award, *5.
Brady medal, 249.
Safety bonus, 258.
Wins Brady medal, 97.

Windsor, Ont.:
—Windsor, Essex and Lake Shore Ry.:
Transfer to people enjoined, 807.

Wisconsin Motor Coach Association:
—Elects officers, 304.

Wisconsin Utilities Association:
—Meeting at Green Bay, 862.

Wood Preservation:
—Havana, Cuba:
Wood in car bodies preserved [Gottschalk], 664.

Worcester, Mass.:
—Taxicab Tariffs:
Must be displayed, 806.
—Taxicabs:
No more meterless cabs, 866.
—Worcester Consolidated Street Ry.:
Approval to take over leased lines asked, 262.
Bus emergency doors marked, 553.
Bus fares in Millbury, 744.
Bus substitution, 866.
Competitive taxis to use meters, 492.
Costs of dismantling distribution over ten years asked, 32.
Fare agreement, 300.
Newspaper advertising, 450.
Nighthawk taxis permitted to cruise, 375.
Taxicab competition, 260.

World Engineering Congress:
—Meeting in Tokio, Japan:
Representatives of 26 countries discuss transportation, 1103.

Y

Youngstown, Ohio:
—Pennsylvania-Ohio Electric Co.:
Accident record, 299.
Brady class A award, *5.
Brady class A award, comments on, 3.
Wins Brady medal, 97.
—Youngstown Municipal Ry.:
New franchise, 742.
New franchise a success, *980.
Operating record, 142.
Operating report, 142.
—Youngstown & Ohio River R.R.:
Bondholders protective committee, 261.
—Youngstown & Southern Ry.:
Extends line, 945.

York, Pa.:
York Railways:
Wage increase, 101.

Z

Zanesville, Ohio:
—Southern Ohio Public Service Co.:
Operation resumed, 299.
Bus substitution, 452.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX
Abbreviations: *Illustrated. c Communications.

AUTHOR INDEX

A

Adams, Harry H.:
—Cars to meet today's demand, *989.
Alexander, J. H.:
—Improved performance is aim of car design, 921.
—Bus as a street car supplement, 924.
Alexander, J. L.:
—Preventing transfer abuse at Houston, *1121.
Alexander, Peter P.:
—Recent developments in atomic hydrogen welding, 612.
de Angelis, M. L.:
—Montreal Tramways extends use of mercury arc rectifiers, *778.
Ashfield, The Right Hon. Lord:
—London's transportation difficulities, *974.

B

Bacon, F. W.:
—Complete car replacement in Lexington returns investment in five years, *759.
Barber, Col. A. B.:
—Motor vehicle regulation demands attention, *965.
Barnes, J. P.:
—We are forever at a turning point, *951.
—Preparation for greater progress, *876.
Beadle, H. J.:
—Improved end cover for commutator end frame, *1132.
—Overcoming controller finger trouble, *543.
—Simple high-potential test set, *287.
—Simple tests for electric car auxiliaries, *132.
—Form for shaping ferrules, *735.
Beardmore, E. A.:
—Protective panel for 600 volt motors, 485.
Beeler Organization:
—Riding habit in large cities, *9.
Beers, R. S.:
—Armature tests and testing equipment surveyed, *798.
—Overhauling cast grid resistors, *731.
—Prolonging the life of electric railway armatures, *289.
—Testing line breakers, *666.
Bennett, C. B.:
—Reinforced grooved girder rail for track drain installation, *1071.
Bibbins, J. Rowland:
—Present trends and future demands determine city development, *893.
—Signals should move traffic, not stop it, *570.
Birch, L. W.:
—Attention to fundamentals reduces overhead maintenance, *539.
Birney, C. O.:
—Construction details of the new Birney car, *117.
Boardman, A. J.:
—Lighter weight cars needed, 924.
Botto, Louis:
—Cold mixed rock asphalt found satisfactory, 135.
—Electric track switch safety device, *24.
—Heavy tamping pads, *287.
—Repairing manganese wear plates, *551.
Boyce, W. H.:
—Co-ordination of taxicabs advantageous, 923.
Bragdon, Roy F.:
—Rail lifter with track jack, *1135.
Braund, F. W.:
—High rate discharge tester, *285.
—Cable rack leakage detector, *547.
—Portable barrel hoist, *737.
—Reclaiming negative battery groups, *1136.
—Synchronous converter lubrication, *854.
—Reclaiming worn converter brushes, *1072.
Brett, R. C.:
—Asphaltum not advantageous for car floors, 482.
Briar, W. L.:
—Portable hydraulic lift, *850.
Brown, F. W.:
—Real express service offers revenue possibilities, *783.
Brown, H. A.:
—Strapping equipment to trolley poles, *1072.
—Artificial load for rail joint testing, *1070.
—Concrete duct for track switch control wires, 1054.
—Flat and cut-rate taxicabs a serious menace, 784.
Brown, H. F.:
—Advantages for railroad-owned power plants, c591.
Buck, Morris:
—New car survey shows increased net on many properties, *583.
—New cars reduce operating costs on many properties, *653.
—New cars pay for themselves on many properties, 715.
—Fares should be put on a more scientific basis, *905.
Bull, R. S.:
—Efficient car maintenance requires many improved devices, 134.
Bullock, Harvey L.:
—Delayed break interlock for circuit breakers, *733.
—Revolving oscillating valve grinding device, *444.
Bullock, Harvey L. (Continued):
—Journal bearings milled in a drill press, *549.
Butler, F. L.:
—Traffic congestion a serious civic problem, 923.

C

Cabot, Philip:
—Competition and rate making, *988.
Chiles, R. T.:
—Adjustable armature winding stand, *402.
Clark, A. T.:
—Some needs for special shop machines, 133.
Clegg, Arthur E.:
—Radiator filling station for buses, *286.
—Method of adjusting brush pressure, *544.
—Equipment test board proves time saver, *800.
Coates, Frank R.:
—Industry advanced by united effort, 923.
Conway, Dr. Thomas W. Jr.:
—Depreciation accounting a major problem, *994.
—Courage, faith and vision will advance interurbans, *963.
Cooke, Charles B. Jr.:
—Buses an essential factor in regional coordination, *930.
Copeland, A. B.:
—Traffic signs used during track reconstruction, *1070.
Cordell, H.:
—Equipment for testing brake rods, 134.
Coyle, Charles F.:
—Taping of bonds prevents electrolytic action, *288.
Crane, Roy C.:
—Engineering aspects of purchasing, *986.
Cresswell, R. N.:
—Brush tension for railway motor brush holders, *676.
Croyle, Joseph:
—One man tie nipper, *550.
—Track gage assures exact spacing of rails, *853.
Cummings, F. A.:
—An essential to successful merchandising is confidence in goods, *917.
Cusani, Ferdinando C. Marquis:
—Mass transportation service expanding in Europe, *646.

D

Dahl, C. H.:
—Substituting invention for convention, 921.
Dana, Edward:
—Railway problem is twofold, 920.
David, T. H.:
—Special frame takes strain in track removal, *127.
Davidson, F. E.:
—Temporary portable crossover, 252.
—Jumpers built for work hose, *1071.
Devers, Charles:
—Pneumatic jig for truck assembly, *675.
De Voe, Linson H.:
—Well informed operators a valuable asset, c1064.
Dobson, J. V.:
—Maintaining carbon brushes for good commutation, *1061.
Draper, Walter A.:
—The bus not a substitute for the street car, 924.
Drowley, F. W.:
—Rail clips for emergency repairs, *607.
Duffy, J. A.:
—New test rack for air equipment, *735.
Dumke, R.:
—Yoke for removing armature bearing housings, *1069.

E

Engelhardt, H. G.:
—Trolley troughs in carhouse reduce fire hazards, *285.
Ewing, D. D.:
—What happens when steel gets tired, *775.
—Fatigue in concrete, *829.

F

Faust, Clifford A.:
—Cleveland terminal project nearing completion, *576.
—New objectives govern vehicle design, *925.
Fennell, D. L.:
—Limited stop plan speeds cars, *1055.
Fennell, R. J.:
—Repairing broken ends of manganese track castings, *608.
Fitzgerald, T.:
—Standardization of car design, 921.
Foote, F. J.:
—Vacuum cleaner for car and bus seats, *130.
—Maintenance of aluminum cell lightning arrester, 292.
Frey, George:
—Standardized cars designed, *157.

G

Geisse, Harold W.:
—Concentrated effort needed for relief of tax burdens, *901.
George, Howard H.:
—Careful organization essential for rapid track reconstruction, *509.
—Handling ballast with a grader, *1042.
—Tie requirements of electric railways, 603.
—Small details important in trackwork, *824.
Gilman, Edgar Dow:
—Regulation of taxicabs necessary for stabilization, *897.
Gleason, A. E.:
—Raising paved track to proper grade, *854.
Gordon, Charles:
—Elimination of parking proves successful in Chicago loop district, *312.
—Co-operative planning and action needed, *955.
Gottschalk, Otto:
—Preservative treatment used for wood in car bodies, 664.
Gould, H. M.:
—Rigid Enforcement of traffic regulation aids flow of traffic, *1119.
Graham, R. N.:
—New bus designs increase usefulness, 924.

H

Hall, Benjamin H.:
—Aluminum angle piece protects window sill, *1130.
Hall, C. B.:
—Costs cut by use of high pressure grease system, *676.
—Double-gage crossover relieves congestion, *610.
—Fare box lights help bus operators, *25.
—Labor and time saving pole racks, *737.
—Limbering up bus engines, *403.
—Maintenance contest teaches better methods, 729.
—New cylinder boring machine pays for itself in ten months, *330.
—Oil reclaiming equipment reduces oil purchases, *214.
—Pull-ins charged to men responsible, *733.
—Stationary track department crane, *853.
—Trolley pan on drawbridge prevents delays, *128.
—Unloading trestle speeds material handling, *551.
Hallihan, John P.:
—Relation of rapid transit to community development, *910.
Hankey, William J.:
—Group form for testing equipment, *734.
Hanna, J. H.:
—Education of trainmen needed.
Hansmann, A.:
—Boring machine for armature and axle bearings, *800.
Hansmann, Adam:
—Pocket below armature bearing prevents oil loss, *1131.
Harvey, A. E.:
—Sealing track in paving is vitally important, *987.
Hecker, G. C.:
—Four Southern properties save $2,000,000 in equipment maintenance during six years, *502.
—Improved machinery and practice raise maintenance standards on Southern properties, *667.
—Systematic maintenance cuts costs on Southern properties, *596.
Heiges, F. D.:
—Trackless trolleys approved in Salt Lake City, *232.
Heusler, R. H.:
—Adjustable broach for slide valve seats, *129.
—Axle tongs save lifting problem, *402.
—Chuck and jig for finishing axle bearings, *24.
—High speed chuck for armature bearings, *288.
—Jig assures accurate drilling for Dowel pin holes, *484.
—Key seats for armature bearings milled in a lath, *213.
Herms, Charles:
—Armature bearing shell expanding broach, *1131.
—Mandrel for turning brake drums, *674.
—Piston ring compressor a handy tool, *129.
—Repairing bus brake cams, *253.
—Sulphur used to repair coupler contact blocks, *330.
—Track switch coil cylinder vise, *550.
Hicks, W. J.:
—Making overhauling of brake rigging a one man operation, *131.
—Hillman, E. H.:
—Light oils for car bearings have possibilities, *535.
Holden, W. W.:
—Bus design will determine its future use, 922.
Holt, C. C.:
—Key for axle bearings reduces troubles, *131.
Hubenthal, John F.:
—Building city tracks for heavy cars, *392.
Hughes, Adrian Jr.:
—Effective, economical bus maintenance, *17.
—Efficient cooling system for bus engine developed, *661.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Abbreviations: *Illustrated. c Communications.

J

Jackson, Walter:
—Edinburgh moves with the times. *1059.
Jacobs, Robert H.:
—Concreted track for New York City subways. *203.
—Track materials, specially designed for New York subways, *325.
Johnson, J. F.:
—Revenue possibilities in bus, 922.
Jonas, E. J.:
—Car body turn-over truck, *797.
Jordan, H. E.:
—Adequate equipment and careful attention vital to proper bus maintenance, *1124.

K

Kauffman, H. L.:
—Methods used in babbitting bearing have marked effect on lubrication, 114.
—Oil in barrels should be protected from the weather, 519.
Keenan, Edward A.:
—Selling bus rides scientifically, *587.
Kelker, R. F., Jr.:
—Subways are costly, 239.
Kinnear, C. R.:
—Expansion joint for girder grooved rail, *543.
Kline, George:
—Improved sand spout used in Cincinnati, *1130.

L

Lambert, Myles B.:
—Better cars and buses needed, *967.
—Convention report number a complete record, c1065.
Lamont, Robert P.:
—Transportation affects all business, *973.
Leary, M. J.:
—Brake cylinder and air tank removing jack, *1069.
—Brake rod testing machine, *1130.
Lummis, Herbert C.:
—Signal should move traffic not stop it, *570.
—Bumpers for cars reduce collision damages, *368.
—Convenient light installation for fare boxes, *214.
Lunda, E. M.:
—Field coil tester a great convenience, *24.

M

Mall, I. O.:
—Detailed analysis of track costs promotes economy, *527.
Mallay, P. D.:
—Requirements of materials for car flooring, 729.
—Clamping arrangement keeps controller handle bases tight, *444.
Marsh, F. A.:
—Jig for machining bus connecting rods, *1133.
—Oilers for center and side bearings, *253.
—Preventing loose armature bands, *549.
—Rebabbitting connecting rods for bus engines, *607.
Mason, S. E.:
—Maintenance award an incentive to better performance, c1065.
Masters, W. A.:
—Interlocking sequence switching in conversion plants, *1072.
MacMurray, G. J.:
—Two young for one generation; two old for the other, *56.
Mayo, A. C.:
—Efforts to correct ambulance chasing in New York City, *998.
Merker, H. F.:
—Flange bearing expansion joint used in Brooklyn, *848.
Miller, Frank H.:
—Many car improvements needed, 134.
Morgan, J. S.:
—Instruction progresses with construction, *1100.

Mc

McAdam, L. H.:
—Constant vigilance needed in maintenance of eltctric track switches, *1052.
McAloney, W. H.:
—Organization cuts maintenance cost, 832.
McArthur, A. S.:
—Accurate garage records insure reliable bus performance, *531.
McCallum, W. J.:
—Track switch box support, *609.
McCarter, Thomas N.:
—Unified transportation is necessary, *959.
McCloy, J. W.:
—Freight business offers possibilities in central states, *192.
McGill, E. H.:
—Mandrel for machining of axle bearings, *1132.
McIlraith, E. J.:
—Do high buildings cause traffic congestion? *630.
McIntosh, A. G.:
—Safety ground device for electric equipment, *796.
McKelway, G. H.:
—Testing friction tape, 736.
McKenzie, John:
—Clutch brake disk for buses, *130.
McLaughlin, W. H.:
—Acceleration rates compared for gas-electric and mechanical drive buses, *699.

N

Naquin, S. J.:
—Testing insulation of armatures during baking, *548.
Neuman, J. C.:
—Assorted layout of track materials, *1135.
Nicholl, H. A.:
—Freight revenue can be increased, 924.
Nobis, E. H.:
—Jack for installing dust cap, *1068.
Nolan, F. A.:
—Track costs studied at Detroit, 665.
Norris, H. H.:
—Congratulations on fine convention issue, c1065.
O'Shaughnessy, M. M.:
—Results justify assessment method of transit financing, *1094.

P

Patison, D. L.:
—Reversible screen holders, *735.
Pontius, P. A.:
—Undercutting railway motor commutator mica, *799.
Porter, Paul T.:
—Pacific Electric expands pick-up and delivery service, *721.
Potter, Harold E.:
—Higher speeds effective in New Bedford, *475.
Pressler, H. C.:
—Straightening front end channel irons, *849.

Q

Queeney, J. A.:
—Fuel oil for buses, *165.

R

Reeves, Glen S.:
—Special tools speed up heater installation, *851.
Reifschneider, Julius E.:
—Emergency splicing ear, *610.
Reifschneider, Felix E.:
—Pedal gong ringer, *734.
Reinker, Christ:
—Field polarity testing device, *1069.
Reuter, Ernst:
—Solving Berlin's traffic problems, 973.
Rexroth, H. F.:
—Prolonging life of window wiper, *850.
Rice, Ralph H.:
—Executives should show greater interest in young employees, c328.
Richardson, George A.:
—Silico-manganese for special trackwork, *254.
Richey, Albert S.:
—Conspectus of indexes for January, 1929, 182.
—Conspectus of indexes for February, 1929, *341.
—Conspectus of indexes for March, 1929, 493.
—Conspectus of indexes for April, 1929, 618.
—Conspectus of indexes for May, 1929, 685.
—Conspectus of indexes for June, 1929, 746.
—Conspectus of indexes for July, 1929, 809.
—Conspectus of indexes for October, 1929, 1083.
—Conspectus of indexes for November, 1929, 1146.
Richey, Albert S.:
—Electric railway fares and wages at highest point in 1928, *91.
Roe, A. C.:
—Reducing costs of armature rewinding, *280.
Rose, H. A.:
—C. H. & D. Ry. modernizes power supply, *357.
Rose, L. S.:
—Bus compressor test stand, *1134.
—Hinged pit covers, *675.
—Hose jumper for buses, *1074.
—Pit jack for removing bus transmission units, *797.
—"Shrunk-In" brake drum liners, *1073.

S

Sawtelle, E. S.:
—Noise reduced by improving fit of worn gears, *660.
Schram, Ross:
—Modern equipment essential to success, 16.
Schultis, John J.:
—Turning converter armatures, *1073.
Scott, Angus C.:
—Efficient method developed for stringing trolley wire, *769.
—Overhead poles supported on long ties, *609.
—Pole brushing device operated by truck engine, 674.
—Portable rope reel, *286.
—Reclaiming trolley ears, *547.
—Staggered location of poles, *1072.
Scullin, Terance:
—Coupler testing and assembling machine, *1068.
Senior, Herbert:
—Removing housings of barrel motors, *1132.
Shoup, Paul:
—Preparing for greater progress, *877.
Silberstein, James Dr.:
—Saving solder, *445.
—Some essentials for trolley wheels, 731.
Simpson, Hawley S.:
—Short signal cycles speed up traffic, *765.
Skelley, F. W.:
—Improved armature-dipping methods developed, *730.
Smith, C. E.:
—Convention number at syllabus on fundamentals, c1065.
—Co-ordination of community transportation, *887.
Smith, Del A.:
—Auxiliary tire inflater, *801.
Smith, Dela. (Continued):
—Cooling system flushing machine, *852.
—Co-operation the secret of good employee relations, 922.
—Tractor used as shop locomotive, *1134.
Smith, Dwight L.:
—Equipment to determine exact location of open circuits, 135.
Snow, William H.:
—Make the interurbans railroad minded, c1065.
Sohl, R. C.:
—Molding staining or varnishing machine, *1068.
Spencer, John L.:
—Keeping lantern wicks from hardening, 214.
—Straight trolley wire for through cars prevents dewirements, *127.
Spenzer, E. B.:
—Bumping rail for installing special track work, *544.
—Rail sanding truck, *1070.
Spindle, S. M.:
—Driving tools speed up armature stick removal, *850.
Spurr, A. C.:
—The small city is a difficult problem, 922.
Stevens, Hoy:
—Brake cam line reamer, *1074.
—Dummy wheels for touring in disabled buses, *801.
—Front axle assembling stand, *852.
Storrs, L. S.:
—Further rehabilitation is industry's great need, 920.

T

Taliaferro, W. R.:
—Choosing electric locomotives to fit the service, *1045.
Thomas, David R.:
—Attracting new freight business fundamental problem of interurbans, *935.
Tipton, Farrell:
—Cotter key extractor, *132.
—Improved switch for flashlights, *851.
—Striped painting makes locomotive conspicuous, *710.
Trautman, W. T.:
—Trolley wire breaks prevented by alert maintenance, *506.
Turner, Daniel L.:
—New York's transit policy produces congestion (Address), 370.

U

Underwood, W. A.:
—Oil buffer eliminates switch tongue slapping, *836.

V

Van Doren, R. N.:
—Regulation must be related to economic law, 197.
Vickers, Leslie:
—Local transportation improving its industrial relations, 1043.
—New era beginning in electric railway franchises, *878.

W

Walker, D. H.:
—Metal W-S signs an improvement over painting on poles, *1136.
Ward, O. M.:
—Maintenance problems with mercury arc rectifiers, *471.
Warner, W. E.:
—Cement for repairing mica, *1123.
Watkin, G. H.:
—Roller sign holder assists cleaning, *548.
Wendell, D. D.:
—Armature dipping tank with underground reservoir, *799.
West, Edward A.:
—Trackless trolley questions answered from experience, *705.
Weyman, H. E.:
—Franchises the foundation of the industry, 923.
White, W. McK.:
—Moderately priced portable asphalt plant recommended, 135.
Whitehorne, Earl:
—A. W. Robertson—the man, *303.
Whitney, E. F.:
—Heat-treated bolts desirable for railway service, *1123.
Wickwire, E. F.:
—A restful ride for ragged nerves, *962.
Williams, A. R.:
—Give people what they want, 923.
Williams, H. S.:
—Reducing noise of car operation, *513.
Willkie, W. L.:
—The public is fair if properly informed, *961.
Wingerter, Laurence:
—Better service at lower fares saves an interurban, *1115.
Wood, Bert C.:
—Ambulance chasing checked in Youngstown, *999.
Wood, W. E.:
—Employee confidence a valuable asset, 920.
—Good service is produced by men and machinery, *958.
Woods, George M.:
—Determining the proper vehicle, *843.
—Six ways to obtain high schedule speeds, *237.

Y

Young, Owen D.:
—Big business a builder, 215.
—Business outlook comments, 191.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Abbreviations: *Illustrated. c Communications.

PERSONAL INDEX

(with biographical notes)

A

Anderson, Edward *184
Andrews, H. L. *750
Annable, A. T. *813
Armstrong, A. H. *750
Armstrong, E. A. 38
Arnold, Bert W. *1088
Arnold, Bion J. Col. 305

B

Baldwin, Seth *997
Bacon, F. W. 414
Beall, Jack 305
Bean, Louis E. 815
Blake, Henry W. 689, 954
Boardman, Albert J. 304, *342
Boyden, James P. 751
Bracken, M. B. 1086
Brehman, A. Balfour 622
Brennan, Mary A. *992
Brown, C. C. 869, 1148
Brown, L. M. 563
Brown, Nelson T. 225, 1149
Brown, R. K. 751
Bruce, William Cabell 686
Buck, Morris 38
Buckland, Edward G. 104
Bullock, Harvey L. *278
Burk, Walter H. 751
Burnham, G. A. 688

C

Cain, J. H. 225
Carlton, Philip *997
Carnes, Jesse E. 456
Chaffee, George T. 815
Chestney, B. R. 183
Clark, C. N. 620
Clark, C. Peter 1027
Clarke, H. A. 185
Chambers, F. C. *1086
Clifford, George H. 1086
Cobb, B. C. 747, 860
Cochran, Horace J. 496
Cohn, Charles M. *343
Cornell, George B. 496
Crampton, C. J. 749
Crowley, Edwin D. 496
Croyle, Joseph *795
Crippen, C. I. 265
Cummings, M. L. 495
Currie, Charles 871
Curtaz, C. J. *379
Curtis, Fayette S. 457

D

Dahl, C. H. *747
Davidson, F. E. *278
Davis, W. J. Jr. *756
Dithmer, Henry L. 1027
Donecker, H. C. *105
Doyle, James J. 185
Druen, D. E. 811

E

Early, Edward 871
Edison, Thomas A. *1085
Ellis, P. W. 622
Emerson, Ralph W. 262
Emmons, Samuel E. 224
Estabrook, George Lee 415
Eustis, John E. 751
Eveleth, C. E. 871

F

Finigan, Charles 751
Fisher, Henry 1028
Foley, William E. *950
Forsgard, Charles H. ...1026, *1086
Fowler, E. W. 1149
Frost, Daniel Corliss 871
Fullen, William G. 104
Fritsch, J. L. 414

G

Gadsby, G. M. 457
Geiger, Frank W. 264
George, Albert T. 343
George, Howard 620
Gifford, C. W. 814
Gordon, Charles *811, 819
Green, D. C. *224
Greenland, Sam W. 864
Griffin, James P. 414
Grunsky, Charles 1149

H

Hadsell, B. R. *183
Hamilton, James F. *104
Hanlon, T. J. 265
Hardin, Charles B. 1087
Harriman, H. I. 38
Harry, M. L. 1088
Hartman, Harleigh H. 687
Harton, W. H. 414
Hayes, J. B. 1085
Hayes, Ross F. 1086
Haymond, E. S. 225
Hecker, Guy C. 1026
Hegeman, B. A. Jr. 415
Heins, John L. 496
Heiny, E. P. 619
Herms, Charles *278
Herr, E. M. *748
Hess, L. W. 265
Hibbard, M. L. 620
Hill, Curtis L. 621
Hodges, A. LeRoy 621
Holtzclaw, J. G. 1147
Hoover, F. W. 495
Horton, R. Harland 814
Howard, W. C. 1149
Hull, J. Fred 748
Huntington, D. L 1028

J

Jacobs, Edward 814
James, R. H. 619
Johnson, Ernest A. 1027
Jonas, Emil John *795
Jones, C. H. 495
Jones, T. Norman 264

K

Kelley, Edward F. 750
Kimball, Dexter S. Prof. 814
King, Fred I. 104
Klabunde, P. W. *997
Kremer, Philip, Dr. 749
Kurtz, Charles L. 563
Kuser, Anthony R. Col. 305

L

Lamb, L. L. 621
Lane, Henry M. 751
Latta, Will H. 751
Leigh, H. B. 1148
Leisenring, John 622
Lemon, L. C. 1088
Lewis, E. I. 104
Lockwood, R. J. Major 815
Loftis, J. M. *749
Loring, Homer 621

M

Maddocks, S. A. 812
Maltbie, Milo R. 554
Markham, Fred L. 304
Marott, Geo. J. 686
Marr, B. W. *811
Marris, Harold G. *814
Marshall, William G. 749
Mase, Paul M. 619
Maxwell, David V. S. 622
Mehren, E. J. 225
Mercier, A. T. *813
Merrick, F. A. *748
Merritt, A. L. 811
Metz, H. A. 1026
Miller, Frank J. 870
Miller, John A. Jr. 38
Mills, F. M. 1088
Mitchell, C. F. 750
Mitchell, H. L. 183, 343
Mitten, A. A. *1026
Mitten, T. E. *1027
Morgan, C. E. *747
Muir, W. *998

Mc

McAdam, L. H. *278
McCance, P. H. 1147
McCardle, John W. 748
McCarter, W. J. 688
McCarthy, J. E. 870
McCarty, W. H. *749
McCausland, Walter 336
McCulloch, Rosco C. 225
McGowan, Joseph A. 689
McGraw, James H. 751
McIntosh, Andrew G. *795
McLimont, A. W. *184

N

Neal, R. S. 813
Neiert, William G. 342
Nicholl, Thomas H. 621
Noah, B. G. *870

O

O'Brien, Denis R. 750
Ogden, P. W. 688
Oug, Joe R. 456

P

Palmer, George W. Jr. 1028
Patrick, Mason M. Maj.-Gen. .. 687
Peck, Darius E. 870
Pelley, J. J. 380
Perry, Samuel M. 815
Pettit, L. A. Jr. 563
Phillips, Frank R. 686
Pilcher, R. Stuart 105
Pole, Felix, Sir 811
Pontius, D. W. *813
Porter, H. Hobart 457, 748
Potter, W. B. *750

R

Redfern, C. E. *997
Reed, E. H. 950
Reeve, C. W. 1085
Riddle, Samuel *950
Reichart, H. L. 747
Robertson, A. W. 144, *303
Robertson, W. S. 748
Robinson, Walter E. *1088
Rose, Leonard *795
Ross, William Gillies 622
Russell, Arthur P. 183

S

Sanders, Henry L. 1026, 1086
Savage, Howard P. 749
Scott, Angus *795
Shaunahan, J. N. 620
Shearer, J. H. 496
Shoup, Paul *950
Simpson, H. S. 1147
Slater, Frederick R. 751
Smith, Albert E. 1028
Smith, Harold 870
Snyder, D. W. Jr. 563
Sparhawk, C. O. 1148
Spurr, A. Clint 379
Squier, Clarence W. *273, 622
Stagg, G. H. 620
Stahl, Milton R. 619
Stanton, W. J. 688
Stauffer, J. R. *1087
St. Clair, Labert *992
Stevens, Ray P. 747
Storrs, L. S. 145
Storrs, Lucius S. 486, 686
Strickler, T. J. Major 686
Studebaker, Clement Jr. 563
Swift, Harley L. 456
Swope, Gerard 814

T

Taurman, A. 224
Thompson, A. W. 184
Thompson, Gaylord 871
Titus, A. P. 225, 264
Tracey, George E. 1026
Troughton, Ella D., Miss. 751
Truesdall, H. C. 379
Tulley, H. G. 563
Turner, D. L. 687

U

Uffert, J. F. *342

V

Van Derzee, G. W. 619
Vaughan, Reginald L. 224

W

Wadleigh, A. G. 264
Wagner, Herbert A. *343
Warner, Edward P. 814
Warren, Alba H. 380
Warren, A. T. 1148
Watson, D. E. 688
Wells, Rolla 415
Welsh, J. W. *812
Wentworth, P. M. 456
Weyman, H. E. 614
Wheat, Carl I. 224
Wheeler, William B. 1148
White, Walter C. *1028
Willkie, Wendell W. 1085
Wilson, Katherine, Miss. 379
Wilson, Paul E. 262
Wingerter, Laurence 1149
Womack, F. Carter *1087
Woodruff, Robert W. ...1027, *1087
Wood, William E. 183, 336, 621
Wood, W. O. 185
Woodcock, F. W. 265
Wright, George L. 749
Wright, O. C. 456
Wysor, W. W. *950

Z

Zimmerman, John E. 182, 379

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Abbreviations: *Illustrated. c Communications.

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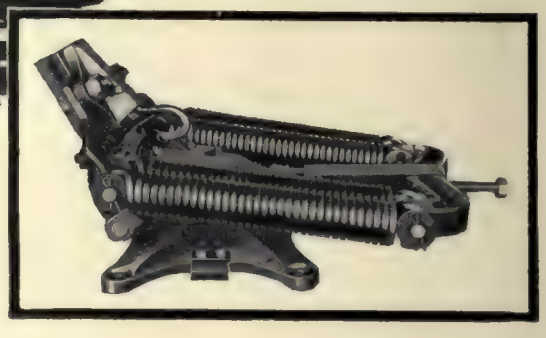
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Advertising Index—Alphabetical, 30; Classified, 26, 28, 30; Searchlight, 25

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January 5, 1929

In This Issue

Editorials 1

Genealogy of Electric Railway Journal—Seeking the Causes of Changes in Riding—Traffic Pipe Dreams—Determining the Proper Standard of Bus Maintenance—By-Products of Safety—An Unusual Recipe for Success—An Open Mind on Coach Design

Penn-Ohio Wins Class A Safety Medal 4

The many ingenious methods of increasing safety, outlined in the Penn-Ohio brief and responsible for the excellent record made by the company in the past year, are outlined in this article.

Analysis Is Made of Factors Affecting the Riding Habit in Large Cities 9

Additional transportation data of the nine cities studied by the Beeler Organization are published herewith to supplement the riding habit data which were analyzed in the Dec. 22 issue of the JOURNAL.

Factors Contributing to Effective, Economical Bus Maintenance 17

BY ADRIAN HUGHES, JR.

Well-equipped shops, an efficient organization, a carefully-arranged inspection system and interdepartmental co-operation are listed by the author as the four essentials for efficient bus maintenance.

New Corps of Co-ordinated Transportation Supervisors Created by P. R. T. 15

Boston Bids Farewell to Old Dobbin 15

Modern Equipment Essential to Success 16

"Buddy" Gets a Permanent Pass ... 22

Brooklyn City Band Draws the Spotlight 23

German Three-Car Train Has Unusual Features 23

Time and Labor-Saving Ideas 24

Improved Equipment Suggestions ... 26

News of the Industry 27

Albany Properties Pass to Control of E. L. Phillips—Reruling on Chicago Buses—Co-ordination Suggested for Cleveland's Rapid Transit Lines—Cascade Tunnel Service to Start on Jan. 12—Continuance of Public Control Recommended for Boston by New Governor—Fare Discussion in Twin Cities

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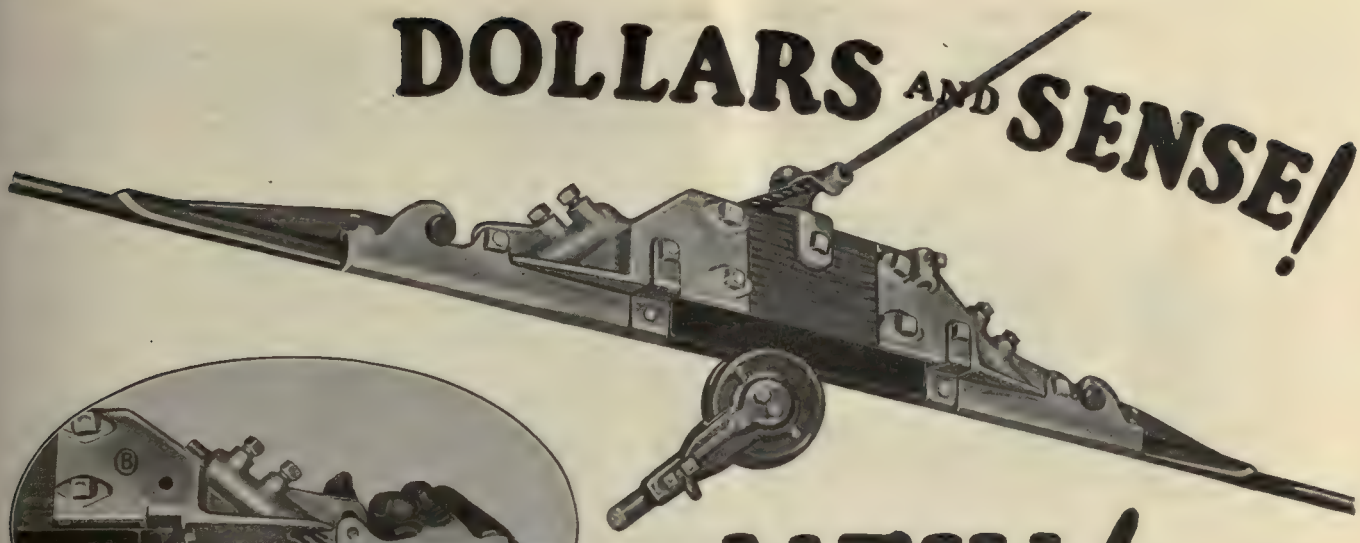
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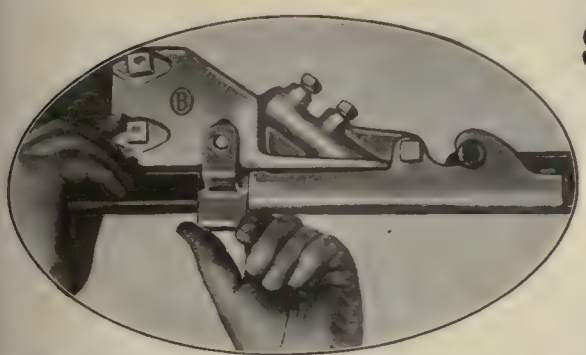


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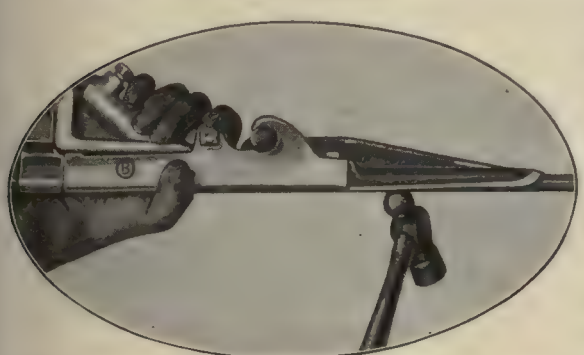
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AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

THIS EQUIPMENT SPEEDS UP SHOP WORK!



Peerless Pit Jack

Designed for work of every character required in the street railway pit. Geared wheel and screw type, combining absolute safety with fine adjustment and two-speed operation. The top has a minimum height of 3 feet 6 inches and a maximum raise to 5 feet 10 inches, measured from the floor. Cradle top or flat top interchangeable. Made of heavy steel angles and allows for side adjustment of 10 inches.





Peerless Pinion Puller

A portable machine for the easy and rapid removal of pinions from armature shafts without removing the latter from the motor. Ample power, small size. Won't damage shafts, bearings, housings or pinions.

Keystone Sand Drier

A heavy cast iron heater surrounded by a sheet iron hopper which rests on a perforated ring. The wet sand is shoveled into the hopper against the heater, and as it dries, runs out through the perforated ring at the bottom. Heaters will burn hard or soft coal or wood and can be fitted for gas.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District Office at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

READ *how this test installation "sold"* these Kentucky traction officials

IN 1926, West Main Street, Frankfort, Kentucky, was improved with modern paving. At the same time, the officials of the Kentucky Traction and Terminal Company decided to make some improvements of their own along this street.

First of all, they gave the concrete right of way the protection of Carey Elastite Expansion Joint, applied transversely, to guard it unfailingly against expansion and contraction stresses. Then . . . to further improve the appearance of the roadway, to shock-absorb the cars, to reduce traction noises, and to provide a T-rail flangeway superior to hard paving material, they installed Carey Elastite System of Track Insulation.

And did this two-year test installation "sell" itself? The answer is emphatically "YES!" For the Kentucky Traction and Terminal Company has recently ordered Carey Track Insulation for two additional stretches of track along their right of way.

If you are planning any track construction work, certainly it will be to your advantage to have our representative call and tell you about this advanced traction improvement. Write.

THE PHILIP CAREY COMPANY
Lockland, Cincinnati, O.





CAREY Elastite System of Track Insulation, as used here by the Kentucky Traction and Terminal Company at Frankfort, is a preformed asphaltic compound, reenforced with asphalt-saturated fibres. It is impervious to moisture, and forms a durable, shock-absorbing cushion between the paving and the rails.

Carey Elastite

SYSTEM OF TRACK INSULATION

Are We Temporizing About Modernizing?

When the Electric Railway Industry agreed to modernize, it was considered an immediately necessary step. And every road which subscribed to this wise policy has had ample time and opportunity to put it to the test.

Today, however, there are properties still hesitating—still finding it as difficult to meet modern competition—still overlooking the economies which modernized equipment would afford. There are some roads which have not—

TREADLE-IZED

—though their number grows smaller day by day

NP

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building



One of the thirty-four big luxurious buses of the Capital Traction Company which operate over the picturesque streets of Washington

Only one flat tire in 35,155 bus miles!

This remarkable record of day in and day out service by Goodyear Pneumatic Cord Bus Tires is not the performance of a single bus, but an average of the entire fleet of the Capital Traction Company, Washington, D. C., for the first ten months of 1928.

Since August 1, 1927, the tire equipment of this company has been *exclusively* Goodyear; and in the opinion of its operating officials, Goodyear Tires give the most satisfactory service the Capital Traction Company has known since it began operating in 1923.

It took a Goodyear Bus Tire with its powerfully tractive All-Weather Tread and its extra-elastic, extra-durable body of SUPERTWIST to give such consistent and uninterrupted road service. Almost one and a half times around the globe before a tire went flat on the job!

After trying other makes, the Capital Traction Company found out that it could operate more dependably and economically on Goodyears. The records of Goodyears kept by this company show a number of instances of tires standing up for 35,000 to 38,000 miles.

More than 200,000 passengers travel over 120,000 miles in Washington every month via Capital buses, and they travel safely, comfortably, and without interruption for tire repairs because Goodyear Bus Tires are quality-built to deliver faithful service at all times.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service, and there are also Goodyear Rubber Tire Chains

GOODYEAR

Copyright 1929, by The Goodyear Tire & Rubber Co., Inc


No. 8M5 Special


No. 327-M Special

No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

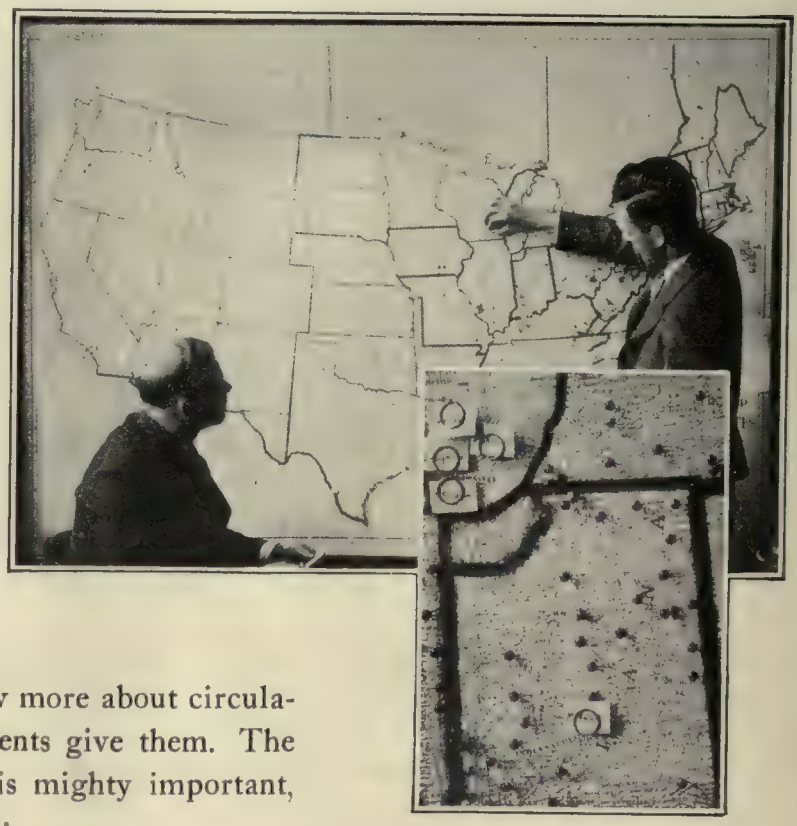
HEYWOOD-WAKEFIELD COMPANY

Boston, Massachusetts

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A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

This is one of a series of McGraw-Hill advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Behind the scenes of circulation building



ADVERTISERS need to know more about circulation than circulation statements give them. The method of building circulation is mighty important, as the following questions suggest:

How do publishers locate and rate subscribing prospects? How do they get them? Why do they get them?

At McGraw-Hill circulation headquarters in New York there is a large map shown on this page. On it here and there are colored pegs which show what circulation we do not have—plants, utilities or service organizations whose buying power should be covered by a McGraw-Hill publication.

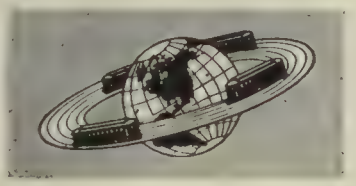
No one—publisher or manufacturer—can map his prospects in this way without continuous research.

Between 50 and 60 salaried McGraw-Hill circulation men participate in this research to locate, rate and get only the decision men of industry and business.

The McGraw-Hill circulation man is trained to help the reader subscribe to the publication that deals most intimately with his daily problems. That is why his card is open-sesame in important industrial plants throughout the country, whose policy is "no book agents admitted."

—The publishers

"CAR CARD ADVERTISING
ALMOST EVERYWHERE"

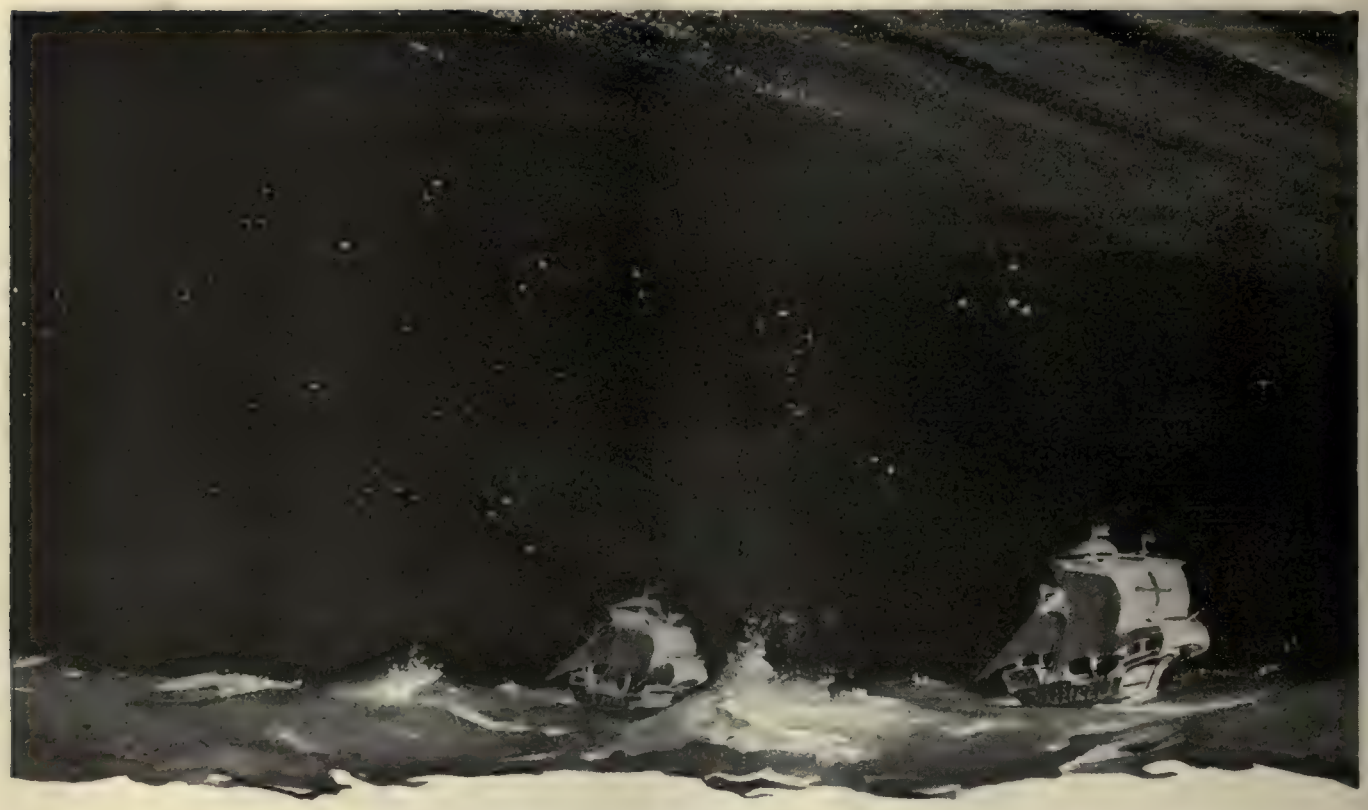


ELECTRIC railway executives have been solving transportation problems and meeting the needs of the people every day, summer and winter, rain and shine, for many decades. No other group is so eminently qualified to economically render proper mass transportation.

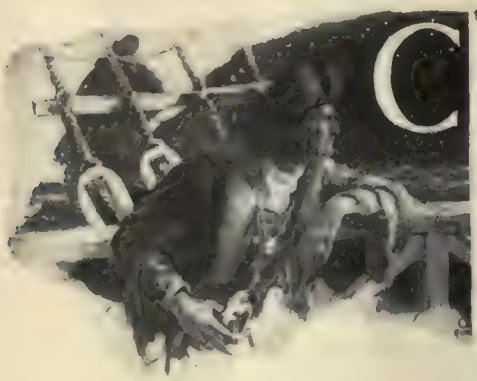
The ability to maintain any service as a real asset can only be proven by a long period of successful operation.

BARRON G. COLLIER
INCORPORATED

NEW · YORK · CITY



What Sleepless Nights Columbus



COLUMBUS was scared. Who wouldn't be? With all his convictions, there must have been a lurking fear that after all the Earth might be flat, just as everybody thought. In the middle of any dark night the Santa Maria might go careening over the edge into oblivion. Every lurch of the vessel helped to keep the ugly thought alive.

After all, Columbus was challenging the belief of centuries. No one had sailed into the Western Sea before. There were no charts . . . how could he know? How could he sleep at night?

❖ ❖ ❖

American business today is navigating strange seas. Speed, style, consolidations, high wages and high buying power, chain distribution, electrical development, synthetics, and all the other manifestations of changed conditions have completely revolutionized the business outlook.

We hold the highest faith in the future of American business. It has met the problems of an expanding civilization with courage and resourceful intelligence.

But the very success of American business has presented its leaders with new problems. Today they are pioneers on a scale never before approximated; and yesterday's trusted business barometers no longer clearly point the way.

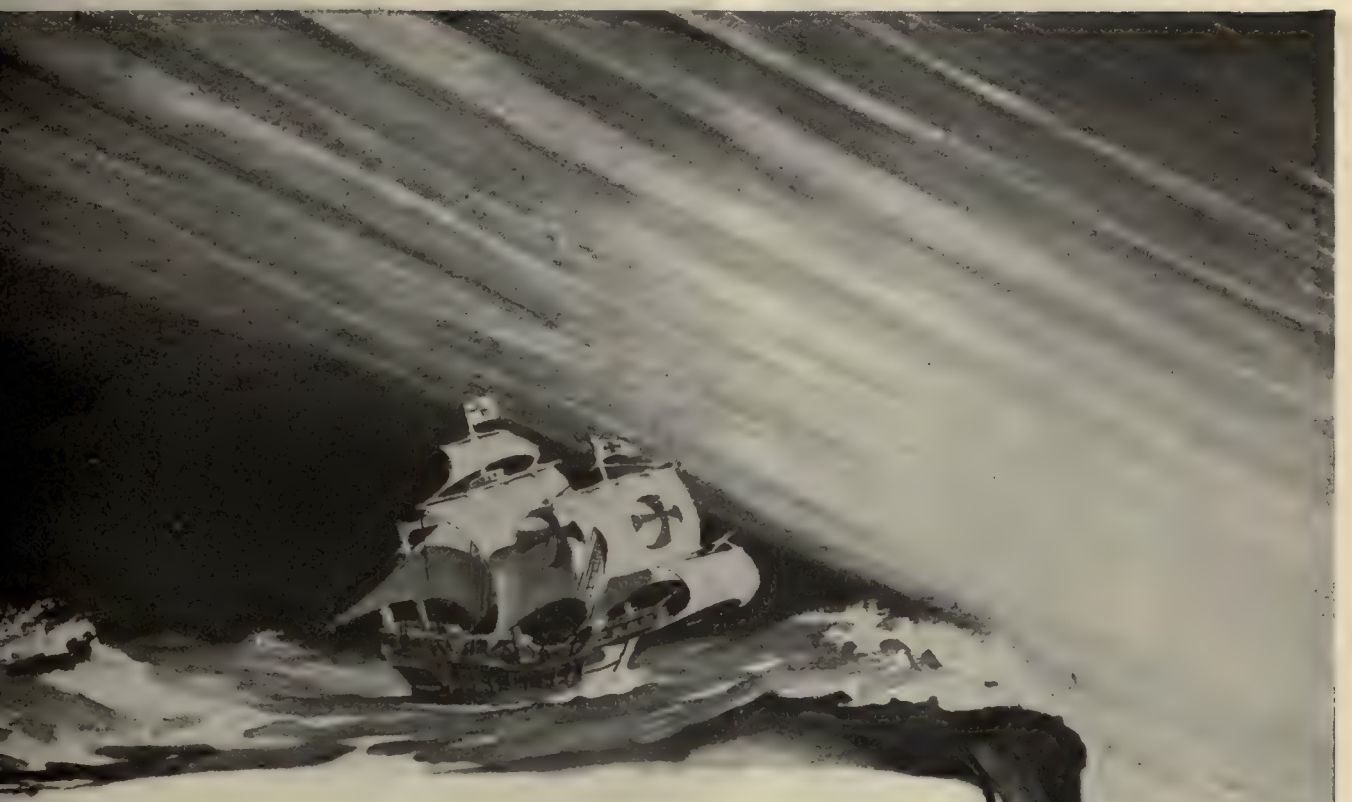
The very greatness of business today underscores the need for a new navigating instrument, *one that will help interpret the effect of today's events and today's changes on tomorrow's operating statements.*

❖ ❖ ❖

That is the expanded purpose of *The Magazine of Business*—to be a magazine of interpretation; to search for the significance and the consequences of

McGRAW-HILL

Mc GRAW-HILL PUBLISHING COMPANY, Inc., New York



Must Have Had

vents; to help you foresee their influ-
nce on your business; to help you
repare for them and make them work
o your advantage.

The Magazine of Business also covers
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f ideas tested in one type of business
hat are applicable to another—
ut always in the spirit of interpreta-
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ith *The Magazine of Business* to catch
vents at their origin and to show
here they may be leading.

Whatever your business, it is subject
o the influence of events taking place outside as well as within—in the electrical, chemical, mining, construction, machinery, transportation, textile and other fields. You cannot directly watch every development and take the time to project its significance to your business. But *The Magazine of Business* does it for you.

Marketing counsel, research, news gathering facilities—in a word, the *resources* of McGraw-Hill—are applied to enable *The Magazine of Business* to fulfill its purpose as a magazine pointing the way ahead for the business executives of America.

THE MAGAZINE OF BUSINESS

is one of 24 McGraw-Hill publications, all actuated by the same spirit of interpretative purpose. 600,000 industrialists, engineers and business men subscribe regularly to these publications. More than 3,000,000 use McGraw-Hill books and magazines in their business.

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24 per cent reduction in cost of operation

In 1925, all but two of the street cars operated by the Arkansas Power and Light Company in the city of Little Rock were of the two-man, low-speed type. In 1926, a change was made to one-man operation, the company selecting G-E equipment for its new and converted high-speed cars.

In 1927, operating expenses were 24 per cent lower than in 1925, the service was greatly improved, the mileage per pull-in was raised 189 per cent, and the revenue was increased.

The Arkansas Power and Light Company is rendering excellent service to its patrons. This company's selection of G-E equipment for its cars reflects its endeavor to offer the best in street transportation.

330-94

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
James H. McGraw, *Chairman of the Board*
Malcolm Muir, *President*
H. C. Parmelee, *Editorial Director*

CHARLES GORDON, *Editor*

Louis F. Stoll, *Publishing Director*

Volume 73 New York, Saturday, January 5, 1929 *Number 1*

Electric Railway Journal is a consolidation of *Street Railway Journal* and *Electric Railway Review*, effected in 1908.

In November, 1884, *Street Railway Journal* began publication, having been started a few months earlier as the street railway department of the *Journal of Railway Appliances*. The new paper was edited during various periods by Robert Grimshaw, George L. Fowler, Emerson P. Harris, C. B. Fairchild and Edward E. Higgins.

In May, 1908, *Electric Railway Review* was purchased and consolidated with *Street Railway Journal* to form Electric Railway Journal. Henry W. Blake, who joined the staff of *Street Railway Journal* in 1891 and in 1894 became its editor, continued as the editor of Electric Railway Journal until 1925, when he was made senior editor. Harold V. Bozell was co-editor from 1920 to 1922 and Harry L. Brown was co-editor from 1923 to January, 1925. Charles Gordon became editor in February, 1926.

The present staff is as follows: editor, Charles Gordon; acting managing editor, John A. Miller, Jr.; senior editor, Henry W. Blake; engineering editor, Morris Buck; editorial staff, Clarence W. Squier, George J. MacMurray, Clifford A. Faust, J. W. McCloy, V. A. Hanson and L. H. Church (Chicago). Paul Wooton is Washington correspondent and Alexander McCallum is London editorial representative.

Seeking the Causes of Changes in Riding

THE OLD rule for approximating the volume of future traffic on a city electric railway was that passengers would increase with the square of the population. Enunciated in the early 90's, this rule generally held true both in this country and abroad until from ten to fifteen years ago. Then it began to show signs of failing, largely because of competition from other means of transport, principally the private automobile. Now, some railways find that their annual returns show fewer passengers carried than the year before, in spite of accessions in population. Even where all the bus service in a city is operated by the railway, there are numerous instances where the passengers on both types of public transportation vehicles are fewer each year, despite increases in the population of the district served. It may be that the old law holds true if applied to all riding, but that does not greatly help the harassed railway manager. The matter in which he is interested is what can be done to retain his business. He wants to know what law has come to take the place of the one which seems to have been superseded? What cities, if any, are showing increased patronage of local public transportation facilities?

Some of these questions are answered, at least for large cities, in a report prepared by the Beeler Organization and recently submitted to the New York Transit Commission. Abstracts appear in this issue and that of December 22. Briefly, the traffic returns for ten years in four rapid transit cities and five cities without rapid transit were examined and showed a fundamental difference. In the four rapid transit cities, the surface traffic by trolley car and bus has generally maintained its former proportions and in some cases has increased, despite increases in travel on the rapid transit lines. In all the cities without rapid transit, there has been a decrease in the combined bus and surface car travel. The reason given for this noteworthy situation is the demand for speed in transit. Where only buses and surface cars provide mass transportation, many persons will use private automobiles and taxicabs for their longer trips. Where rapid transit has been installed, the surface lines gain in short haul business more than they lose in long hauls, because many rapid transit passengers use them to complete their journeys. Supplementary evidence on this explanation of the effect of rapid transit on surface vehicle riding is found in the fact that the cities with the largest proportion of rapid transit have the highest riding habit on cars and buses and the lowest registration of automobiles per thousand population.

Granting this diagnosis, what is the remedy? What factors may be expected to increase riding in cities without rapid transit? The report does not discuss this question because it was prepared for another purpose, but perhaps the answer can be reached by the process of elimination. Is a solution to be found in more general use of private automobiles and taxicabs? Obviously not. The congestion on city streets is now bad enough. Is the remedy buses? No, again. The report indicates that extended bus service in all the cities studied has not altered the situation. Where buses make frequent stops, they are no faster than trolley cars of the same size. Is the answer to be found in the construction of rapid transit systems in cities now without them? This is evidently one remedy, but it should be remembered that a rapid transit system is very expensive to build and can be made to pay only under conditions of continued dense traffic. Few cities can afford subways.

The only other possibility is improvement and greater use of existing railway and bus systems. This will have to be the answer in most cases. With greater restrictions on the use of individual transportation vehicles, which are notoriously wasteful of street space, with greater organization and co-ordination of the several agencies using city streets, and with higher speeds for the trolleys and buses, many cities will be able to postpone for many years a complete sub-surface or elevated system. After all, the point most emphasized by the report is the demand by the public for speed in transit. More attractive rolling stock and better schedules, coupled with the judicious addition on certain routes of express higher-fare buses, should bring back much of the business which

has been lost. The report is indeed thought provoking and is worthy of serious attention by every transportation executive.

Traffic Pipe Dreams

LIKE a hardy perennial, the idea of double-deck streets as a panacea for all our traffic ills springs up at regular intervals. It is hardly surprising that this suggestion attracts the attention of a public harassed by the constantly increasing inconvenience, delay and danger from the flood of vehicles in our streets. The industry which has produced the greatest part of this traffic flood and which is dependent for its continued prosperity upon finding additional space where automobiles can operate, naturally seeks to induce the community to provide this space. That is to be expected. But when the automobile manufacturer is carried so far by his enthusiasm that he makes misleading statements regarding the relative economic importance of other forms of community transportation, it is time to challenge his competence or his motives. A striking example is furnished by the statement printed a short time ago in the Detroit *Free Press* and attributed to R. E. Olds, veteran automobile manufacturer:

"Light steel elevated speedways could be built on Detroit's main arteries at a fraction of the enormous cost of subways. Through traffic could travel at top speed on the raised roadway and local traffic could use the surface streets. This system would last many decades after subways have become obsolete and would establish Detroit as a world leader in handling the transportation problem. After building the elevated, the city should purchase two or three undesirable business blocks in the downtown district and erect municipal garages of the ramp style, ten or twelve stories high."

A proposal of this kind would be too ridiculous to merit serious consideration, if similar ideas did not have a persistent habit of bobbing up in the public press. The impracticability of the scheme is easily seen. First of all, we are urged to use individual vehicles for transportation instead of public carriers. Then, because the vehicles must be stored somewhere during the day, the community is asked to condemn property in the crowded business district to provide great free public garages. Imagine the hours between 5 and 6 o'clock in the evening or 8 and 9 in the morning at these garages! Since Mr. Olds considers subways obsolete and presumably street cars too, there would be added to the 25 or 30 per cent who now use individual transportation, the 70 or 75 per cent who are dependent upon public vehicles. Neglecting for the moment the matter of cost, consider only the physical situation at these garages. The congestion and confusion would be appalling.

But inevitably the matter of cost does come up for consideration. The city is asked to provide these great free garages, and then the double-deck streets, at a fraction of the cost of subways, according to Mr. Olds, but it seems hardly likely that the automobile industry will come forward to provide the funds. In addition, those who now ride public transportation vehicles and who are to be denied the privilege of continuing that economical method of travel, must provide their own automobiles, which on the most conservative basis will cost them from 8 to 10 cents a mile to operate.

Experience fails to furnish any justification for the assumption that double-deck highways can be built for a fraction of the cost of subways. Furthermore, there is the possibility of elevated rapid transit to be compared with the cost of elevated highways. Mr. Olds seems to have overlooked the fact that competent engineers have estimated that one four-track rapid transit system, either subway or elevated, serves more people in the rush hour than can be carried by 25 express boulevards for private automobiles at the average conditions of loading found in city service! Actually it would probably be cheaper to provide each traveler with an individual upholstered arm chair in a rapid transit train than to provide transportation under Mr. Old's plan. Why not try that? If we are to solve the traffic problem by indulging in a pipe dream, let's make it a good one.

Determining the Proper Standard of Bus Maintenance

SUPERINTENDENTS of equipment and garage foremen are trying constantly to reduce the cost of maintaining buses. New methods, new materials and modern equipment often permit substantial savings to be made. However, it is important to remember that many of the ways of lowering maintenance cost also lower the standard of maintenance. For example, if fewer inspections are made, the cost will be less but the buses may not be kept in a proper state of repair. Or, if buses are cleaned only every week instead of being cleaned after every run, a large saving will be made in labor, but the buses will not appear as they should. The big problem, therefore, is to determine the proper relation between the standard of maintenance and the cost of doing the work. This is a problem which cannot be solved satisfactorily by any known formula. The foreman of the garage might, offhand, be considered the logical one to determine the proper balance between the standard and the cost, but his duty is primarily to take care of the shop work, supervising the technical details and the personnel. He is responsible in a great measure for the effectiveness of the methods and equipment used in the garage and can influence to a large extent the cost of the various phases of the work, but his experience may not be sufficiently broad to permit him to determine correctly the proper standard of maintenance.

Again, the superintendent of equipment might be thought to be the one to decide this question. His opinion is valuable, but can hardly be considered final until the entire organization has been consulted. The fact is that personal opinion alone cannot be relied upon to determine the proper balance between the standard of bus maintenance and the cost. As pointed out by Adrian Hughes, Jr., superintendent of bus transportation of the United Railways & Electric Company of Baltimore, in an article published elsewhere in this issue, there is a need for some practical and direct method of answering this question. Mr. Hughes mentions that in Baltimore the number of road failures or service calls per 10,000 miles of bus operation is used as a measure of the condition of the equipment and that the allowance for each vehicle is determined from its condition. The trend in the number of service calls from month to month or from year to year, should be a positive indication of the condition of the equipment and should reflect the effect of the expenditures for maintenance. The method used in Baltimore may not be the best means of indicating the minimum figure, but at least it is a good one. Certainly, it is reasonable not only to obtain the personal opinions of the manager, the superintendent of equipment and other supervisory officials, but also to refer to figures which indicate the condition of the vehicles.

By-Products of Safety

AMONG the results of any organized safety effort, such as that which inspired the contestants in the recent Anthony N. Brady contest, are a reduction in the number of accidents and a decrease in the injury and damage payments. These are the items that affect the balance sheet. That they are important factors goes without saying. By no means all of the benefits that accrue, however, can be measured in dollars and cents. One of the points brought out in each of the briefs submitted is the psychological effect upon public opinion of the measures taken by the companies in the interest of public safety and accident prevention.

In Youngstown, Ohio, the center of the activities of the Penn-Ohio System, winners of the Class A Award this year, the practice of instituting law suits based upon real or alleged injuries, had developed into an organized industry. Not only was the trolley company being systematically victimized but casualty insurance companies, local corporations and even individuals were being mulcted in suits which had little basis in fact or justice. As the result of resolute steps taken by the Penn-Ohio System, in which it had the active support of a citizens' committee, organized for that very purpose, this practice was to a large extent broken up. The energetic measures taken are expected to have a lasting effect upon the shysters who have plagued the community by their ambulance-chasing activities. That it will also have a favorable reaction among the more substantial interests in the district is assured. And now that the company is in position to announce that it has been accorded national recognition through the granting of the Brady Award, it is safe to say that the general public will not be backward in giving credit where credit is due.

In discussing the effect upon public opinion of the winning of last year's award, the El Paso Electric Company, in its brief this year, says: "This achievement has thoroughly convinced all citizens of the community that we are operating our cars in a safe and efficient manner. . . . The natural civic pride that has resulted has had a beneficial effect in creating a general safety consciousness which has helped to reduce all types of public accidents." It is within reason to expect that on the properties of the Penn-Ohio System, the Tampa Electric Company, and the Tide Water Power Company, winners of the latest awards, the results during the months to come will be none the less substantial, even though they may not be measured directly by a monetary yardstick.

An Unusual Recipe for Success

AT A DINNER a few weeks ago, citizens of Richmond extended an unusual tribute to the winner of the 1928 Coffin award. Each speaker praised the company's achievements in his own way. It remained, however, for the witty toastmaster, who, by the way, had led the fight against this very property three years before, to give the real reason for the Virginia success. "Hold your breath under water longer than the other fellow," he said, was a recipe for success given him by his father, and evidently the owners and management of the Virginia Railway & Power Company were adept in this art.

Although unbeknown to the public, a lot of this "breath holding" is being practiced throughout the local transportation industry. Some managements have come up for air, but few have been rewarded with such praise as was meted out in Richmond. It is a heartening thought, however, that the painful experiment has in some cases received its just recognition. It holds out increased hope to those who are inclined to question whether or not persistent effort toward improvement of transportation service in the face of present inadequate return, is really worth while.

An Open Mind on Coach Design

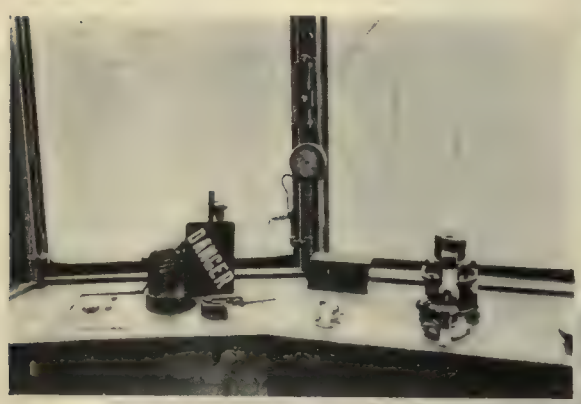
IT REMAINED for a leader in the bus field to marshal a really comprehensive analysis of the difficulties that face the automotive engineer in building vehicles for public transportation. This was done in the article by G. A. Green, vice-president in charge of engineering of the General Motors Truck Company, printed in last week's issue of the JOURNAL. And in thus frankly presenting the facts, particularly with respect to the wide gap that separates bus and automobile performance, the author has unquestionably rendered a distinct service to the entire local transportation industry. Furthermore, in throwing aside the inhibitions of commercial considerations to the extent of talking out to customers and competitors alike on the engineering and common-sense questions involved in bus development, he leads the way toward that frank discussion and interchange of ideas which has for so many years accompanied and been largely responsible for the spectacular strides made by the automotive industry.

One word suffices to define the primary problem of the bus—power! Higher acceleration and higher schedule speed are required to meet the public demand for automobile performance. But as Mr. Green also points out, this standard of comparison is not fixed; it is itself moving forward constantly. Each year the new models of passenger cars are subjected to an annual reaming process to give constantly increasing power output. To meet present automobile standards of performance with buses of the conventional 29-passenger type (Mr. Green bases his figures on a total loaded weight of 19,250 lb.) would require engines of from 1,400 to 1,600 cu.in. displacement! And that is on the assumption of no increased weight for the larger engine.

Here are considerations that demand careful study by the purchasers and manufacturers of buses. The demand for large vehicles exists because the buyer of coaches presses constantly for increased carrying capacity. He visualizes the possibilities of hauling an increased number of passengers for a given labor cost. This applies not only to buses for city service, but to long-distance intercity operators as well. But larger capacity is only one phase of the demand.

Undoubtedly it is high time to face the economic as well as the engineering facts. There is danger that the bus industry may enter upon the same vicious cycle of increased vehicle size and cost that is responsible for many of the difficulties of the railway industry, though there are many railway men who do not, even at this late date, fully understand this fact. If engines of the size indicated by Mr. Green should be built, they would mean heavier chassis, greater fuel consumption and increased first cost. These are to be balanced against the driver's time. Only by the most careful study of these several factors can costly mistakes be avoided if the demand for large size and increased power persists. Perhaps this study would lead to smaller, not larger buses. All of which emphasizes the need for preserving an open mind, and for the kind of frank discussion in which Mr. Green has so courageously led the way.

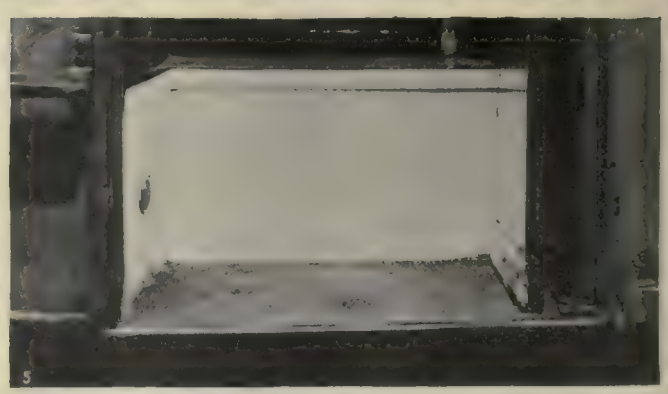
Constant Attention to Precautions for Safety Mark the Practice of the Penn-Ohio Company











No. 1. A danger sign on the controller protects the repair man

No. 2. Such a car, with its safety messages, is a constant reminder of the need for carefulness

No. 3. These signs, illuminated at night, warn of car turns out of and into the highway

No. 4. Automatic car stop, which sets the brakes unless the signal indication is permissive

No. 5. Step wells are painted white so they can be distinguished easily at night

Penn-Ohio Wins Class A Safety Medal

Brady Award in Class B goes to Tampa Electric Company and in Class C to Tide Water Power Company of Wilmington, N. C. Many ingenious methods of increasing safety outlined in Penn-Ohio brief



Crossing a street in Youngstown under signal

PRESENTATION of the awards in the 1927 Brady Safety Contest was made at the meeting of the Metropolitan Section, A.E.R.A., on Jan. 4. The winner of the medal for the best safety record among the Class A roads, or those operating 5,000,000 or more car or bus-miles during the year, was the Penn-Ohio System. Honorable mention in Class A was given to the Louisville Railway Company, winner of the award last year. The medal among the Class B roads, or those operating between 1,000,000 and 5,000,000 car and bus-miles annually, was awarded to the Tampa Electric Company, with honorable mention to the El Paso Electric Company.

The medal for the Class C roads, or those operating less than 1,000,000 car and bus-miles last year, was awarded to the Tide Water Power Company of Wilmington, N. C. This company was also the winner of the same medal last year for its excellent safety record and methods. Particulars of the ceremonies accompanying the award of these prizes will be published in next week's issue. An outline is given here of some of the safety practices of the Penn-Ohio system, winner in the Class A group of companies. Data in regard to safety methods of the other competing companies will follow in later issues of Electric Railway Journal.

Altogether the Penn-Ohio system comprises 60 miles of interurban railway, 380 miles of motor bus routes, 73 miles of city railways and 42 miles of city bus routes. Within Youngstown the operation is conducted on a service-at-cost franchise by the Youngstown Municipal Railway. Outside of Youngstown the operation is conducted by the Pennsylvania-Ohio Public Service Corporation through a number of subsidiary operating organizations.

In some respects the industrial nature of the community served has made an intensified accident prevention policy a necessity. The steel industry, which is very prominent in this district, depends for its labor upon a population which includes a very large foreign element. Moreover, for some years past a commercial business has developed of propagating law suits based on injuries. While the victims of this malicious practice have been accident insurance companies, steel companies and steam railroads as well as the local transportation companies, this condition has added another incentive to the utilities in the district to organize for safety work. Fortunately, the situation has now been taken in hand by a citizens' committee and the local bar association, and ambulance chasing will be soon a matter of the past.

The safety program of the Penn-Ohio and associated companies has been developed consistently during a



White safety belts protect track men



This safety zone with pipe railing enables passengers to board the cars safely at an industrial plant



Lights on the bumper of coaches give the operator a wider range of vision during night driving



Heaters prevent window frosting

period of nine years. The program embraces the following factors:

(A) The prevention of accidents wherever possible through mechanical means:

1. Every street car in regular service is equipped with complete safety features, such as ordinarily are found only on Birney cars. The same is true of the interurban and suburban cars.
2. Every railway crossing is provided with trolley guards.
3. Every siding or switch where cars pass is provided with automatic signal lights. There is only one hand-throw signal on the property.
4. Hand-throw switches are used only where circumstances render it impossible to install electric switches.
5. There is no old or obsolete piece of special trackwork on the system.

(B) A complete program of educational work in accident prevention is carried on through the following agencies:

1. Bureau of Safety of Chicago, consultant and advisor.
2. A system safety supervisor.
3. Safety committees embracing: (a) Central executive committee, (b) central transportation committee, (c) intermediate committees, (d) local groups.
4. A complete looseleaf record of the accidents of each car or bus operator.
5. Safety contests which have been carried on continuously for several years.
6. A bonus system on the lines of the Youngstown Municipal Railway.
7. A company magazine for employees, devoted largely to safety work.
8. Dinner meetings at which officials meet with employees to increase interest in accident prevention.

(C) Active co-operation of managers and superintendents in safety work, and active participation in all public safety efforts in the communities served.

These efforts have been effective, as shown by the reduction in accidents during the first seven months of 1928 as compared with the first seven months of 1927. The figures are shown in the table below.

SEVEN MONTHS ACCIDENT RECORD, PENN-OHIO AND YOUNGSTOWN MUNICIPAL RAILWAY

	Jan. 1 to Aug. 1, 1928	Jan. 1 to Aug. 1, 1927
Street cars	1,226	1,470
Buses	712	828
Total	1,938	2,298

Means By Which Safety Has Been Effected

Means by which greater safety has been effected are given in the brief submitted by the company for the 1928 Brady Safety Award. A few of them will be mentioned.

One of the contributions to the cause of safety was the "white safety car." A standard safety car, equipped with full safety devices, was decorated inside and out with white Duco. Then different slogans were painted on the exterior. Each slogan was followed with the name of its sponsor, such as the Boy Scouts, Playground Association, Youngstown Automobile Club, and others. A few of the slogans follow:

"Make motoring a pleasure, not a peril."
"Help prevent accidents. It is your duty."
"The best safety slogan is to be careful."
"Say it with brakes and save the flowers."
"Motorists, look back before you leave the curb."
"A bed at home is worth two in the hospital."

A unique feature of the car is that it is illuminated at night, which makes it even more effective then than in the daytime. In the inside of the car, in place of the usual advertisements, the card racks carry safety posters furnished by the National Safety Council. This car was operated during 1926 in regular passenger service on

each car line in all of the communities served, and has acquainted the people of these sections with the company's endless efforts to prevent accidents.

The city of Youngstown and the company shared in the purchase of a machine which is used to paint "car swing," "safety zone" and other markings on the street pavement. The painting is done by city workers, with a railway representative on hand, when necessary, while the work is being done.

Where railway tracks turn from the center of the street to private right-of-way or from the side of the highway on to the highway, illuminated warning signs like that illustrated are erected. They have a background of burnt orange with black lettering and are illuminated by four 40-watt lamps. Four red lenses are arranged to attract the attention of the approaching motorist. The lamps are set in such a manner as to floodlight the lettering to warn the motorist of danger.

An automatic car stop, developed by the Nachod Signal Company, has been installed on interurban cars. The car stopping device consists of an arm in the shape of a loop supported on a pipe extending from a pole across the track. This arm has two positions: When raised it clears a car running under it; when dropped it is low enough to break a glass tube fixed on the top of the car. This tube is connected to the automatic air brake system in such a manner that when broken the brakes will be automatically set. The position of the stop arm is controlled by the signal indication, and is raised only when the signal shows "permissive." It is dropped in the other two indications, namely, "neutral" and "stop."

This automatic car stop has been found to stop a car within 168 ft. on very slippery rails when the car was running 40 m.p.h. When the car was running 20 m.p.h. the distance was 80 ft.

Wooden steps on all city buses have been replaced with perforated steel non-slip safety treads. The step wells have been painted white and are illuminated at night by an electric light. Electrically operated track switches have been installed in city streets over the entire system.

The territory served is one in which dense morning fogs are a frequent occurrence. To guard against accidents in operation in such circumstances, all car and bus operators reporting for duty when foggy conditions prevail are required to sign their names to an "order." In this the operator acknowledges that he is aware that there is a fog, that rule 113 requires operators to regulate the speed of their car (or bus) so that it can come to a full stop in less than the distance the operator can see, and that he agrees to operate his vehicle and car with a view to safety, disregarding schedule, if necessary.

Track men, who are required to be on the street or right-of-way without protection of red or yellow flags, wear a white rubber belt and shoulder straps. These permit them to be seen readily at a greater distance than would otherwise be the case. No track man has been injured by an automobile since the belts have been worn.

A danger banner is displayed on the controller handles of electric cars and the steering wheels of motor buses when repairs are being made. This protects the mechanic or repair man when working on the vehicle. No person is permitted to move a car or bus while the danger banner is displayed.

In the shop, foremen are required to inspect all tools used by their men and remove any which are not safe or show signs of stalling. This inspection of tools is re-



This truck sands dangerous grades



Car bumpers are illuminated at night



Cinders are used on slippery roads



Bulletin boards warn of hazards

quired daily. The foremen and the men in the track gang are furnished with goggles and are required to wear them when working on concrete, stone, or any other work where eye injuries would be apt to occur.

At the entrance to the main works of the Youngstown Sheet & Tube Company, which is a heavy passenger boarding and leaving point, a raised safety zone with railing has been erected. It is lighted at night.

Illuminated bumpers have been installed on interurban coaches to give the operator a wider range of vision during night driving.

Two special automotive sand trucks have been built to sand dangerous grades. The trucks are equipped with a step at the rear so that a man may shift a sand pipe, along the rail and thus rapidly and safely do the work. Sufficient sand is carried to last an entire day unless the rail conditions are unusually dangerous. In addition to being used for sanding the track, the bus is equipped for switch repairing and curve greasing.

A brake-testing machine has been installed for making all brake adjustments on coaches and buses. It has reduced coach and bus pull-ins on account of brake trouble by 85 per cent.

Experience indicated that collisions, in which certain large cars were involved at night, were caused because certain automobile drivers mistook the single headlight for that of a motorcycle or an automobile with but one headlight burning. To prevent this the front bumper was painted white, as shown in one of the illustrations. It is illuminated at night.

As a safety precaution against operators misjudging the distance at railroad crossings, yellow lights were installed 100 ft. on each side of these crossings. They burn day and night. A reserve lamp relay has recently been added, in which a half yellow and half color cap is used. When this lamp is burning it warns the operator that one lamp is burned out and he reports this back to the dispatcher.

One-piece windshields have been substituted for two-piece windshields on the local Youngstown buses. They are found to obscure the driver's view less.

The company hauls a supply of cinders to points near dangerous curves or grades, where the cinders are stored by the highway department of the state. Then when the highways become slippery, the cinders are spread over the road by the state highway department, or in case of emergency, by company employees.

Bulletin boards are placed in each reporting room for the operator to report any unsafe condition or hazard that may come to his attention during his period of duty. All operators are required to examine the bulletin boards before going to work.

Thorough Organization

Mechanical aids for safety would be of little value without organization, just as organization would be of little help without mechanical aid.

All employees, foremen, superintendents and officials of the company are divided into proper groups, so that their personal effort and interest may be secured. These groups hold periodic meetings for the purpose of considering accident and fire hazards and unsafe practices and means for their elimination. This home study is supplemented by frequent inspection of the property by experts of the Bureau of Safety of Chicago.

Another means of securing suggestions is through the *Safety Bulletin*, a monthly publication of the Bureau of Safety, which is distributed to members of the safety committee. Appropriate original and contributed articles, illustrations and charts are published in this bulletin, with practical suggestions for the elimination of accidents. Suggestions are solicited particularly from those who are in closest contact with the work, i.e., the operators on the cars and buses, and the shop and garage men. To stimulate the contribution of suggestions, a special form has been printed on which they may be written. The suggestions are deposited in boxes in the garages, terminals and reporting rooms, or they may be handed directly to their supervisory officials or to any member of one of the safety committees. All suggestions are acted upon by the committee, and the maker of the suggestion is notified of the action taken. If in the opinion of the committee a suggestion is not practical in the form in which it was made but has possibilities, the maker of it is requested to supply more information in order that the suggestion may receive further consideration. This is done in such a manner that the person making the suggestion realizes that it has received full consideration.

The prone-pressure method of resuscitation is taught to all employees, and the value of such training is emphasized at every opportunity. In addition, training in application of first aid to injured persons is encouraged.

The safety work of the organization is intrusted to twelve committees. Ten of these are divisional committees and are made up largely of railway operators, coach operators, or shop men. These committees report through a central transportation safety committee to the executive central safety committee. This committee consists of the general manager of the company, manager of railways, chief electrical engineer, superintendent of power, transportation safety supervisor, electrical safety supervisor, general claim agent and director of public relations.

Bonus System Is in Effect

A bonus system to reduce accidents was placed in effect on the Youngstown Municipal Railways on Jan. 1, 1924. Briefly, the plan is as follows:

Each railway or bus operator who operates for one month without an accident is paid a bonus of $1; for the second successive month without accident he receives a bonus of $2, and for the third successive month and for each successive month thereafter, $3.

An operator having an accident in any month must start on the first day of the following month with a clean slate, and again operate for three consecutive months without an accident before he is entitled to the maximum bonus of $3 a month. An "unreported" accident, charged against a railway or bus operator, loses for him the right to a bonus for three months.

A regular man must work at least 25 days in a month, and an extra man at least 175 hours in a month to be eligible to receive a bonus.

During 1927, the largest number of railway operators at any one time was 181, and the total number of railway operators during the year was 205. Of this number 191 operators received a bonus. The largest number of bus operators at any one time was 87 and the total number during the year was 101. Of this number 95 received a bonus.

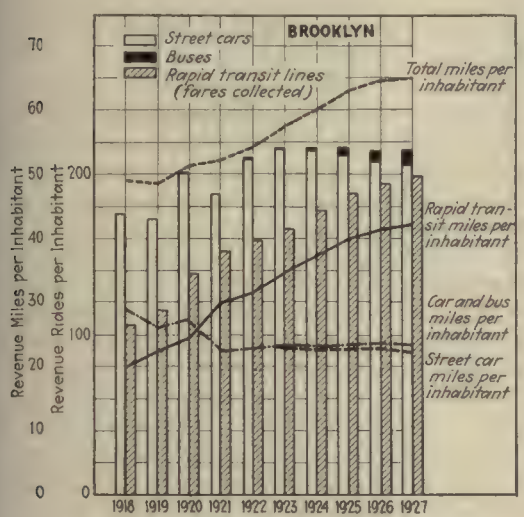
The fact that these precautions pay in lessened accidents is shown in the fact that the chargeable accidents on the Penn-Ohio System were reduced from 902 in 1926 to 705 in 1927, or a reduction of 22 per cent.

Analysis Is Made of Factors Affecting the

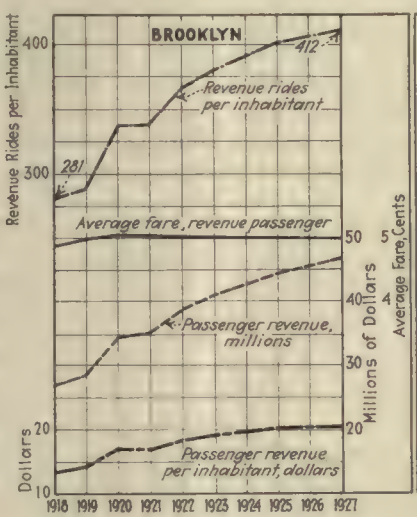
Riding Habit in Large Cities

Detailed statistics extending over ten years for nine cities presented by Beeler Organization. Effect on surface car traffic of rapid transit and bus developments

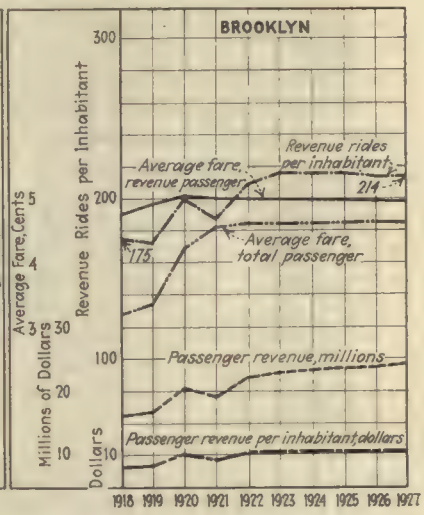
A REVIEW of traffic statistics from nine typical cities, made by the Beeler Organization to determine the relations between rapid transit, surface car and bus riding and the use of private automobiles, was published in ELECTRIC RAILWAY JOURNAL for Dec. 22. Briefly the study showed that the tendency of rapid transit development in any city is to increase surface car riding but that the extension of bus service has had the contrary effect. The review was part of a study conducted by the Beeler Organization for the Brooklyn City Railroad and Brooklyn-Manhattan Transit Corporation in connection with the proposed award of additional bus franchises in Brooklyn. In addition to the data abstracted in the issue of Dec. 22 the report contained a series of graphs covering traffic data for ten years in each of the cities mentioned. A number of these graphs are published in this issue with an abstract of the contents of the report.



Borough of Brooklyn—Annual revenue rides and vehicle-miles per inhabitant



Borough of Brooklyn—Transportation data for ten-year period. Surface cars, buses and rapid transit lines



Borough of Brooklyn—Transportation data for ten-year period. Surface cars and buses only

Borough of Brooklyn—With the great rapid transit development which has occurred in Brooklyn during the past ten years and the consequent revolutionary changes in the location of population in that borough, the function of the street railway lines has changed radically. Long-haul riding has been diverted to the rapid transit lines, and the surface lines now act largely as local distributors to the many new community centers.

Based on fares collected at the rapid transit stations located in Brooklyn, these lines in 1918 carried each resident an average of 106 times. This increased almost steadily year by year until it reached 198 in 1927. During the same period the street car revenue rides per inhabitant increased from 175 in 1918 to 215 in 1923. Since then the number has slowly declined to 205 in 1927. Independent bus operation was inaugurated in Brooklyn in 1922. When the revenue passengers carried by the buses are added to those carried by the street cars, the total surface revenue riding is found to have remained practically stationary and the street cars to have suffered an actual loss in total rides from 507,658,855 in 1918 to 501,069,397 in 1927.

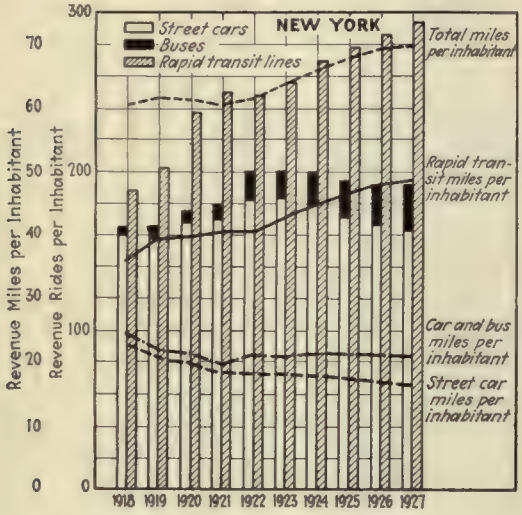
A comparison of several facts relating to car and bus operation for the year 1927, which shows the relative extent of their use in Brooklyn, follows:

	Brooklyn, 1927		
	Bus	Street Car	Total
Miles of routes operated	21.2	316.7	337.9
Cars or buses operated	67	1,576	1,643
Number of routes	9	69	78
Car or bus-miles	2,142,795	50,216,273	52,359,068

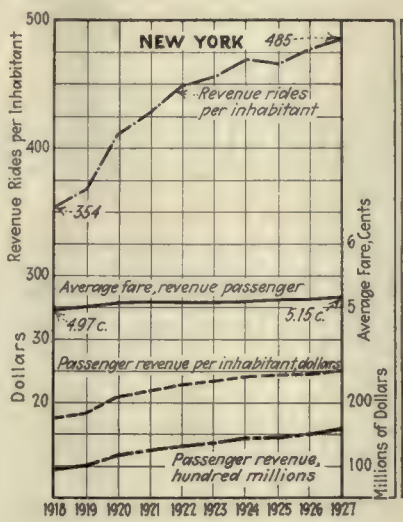
A study of the distribution of population in 1925, which totaled 2,203,235, shows that some 2,045,835 people, or 92.9 per cent, live within a quarter of a mile of an existing surface car line and some 2,125,235 people, or 96.5 per cent, live within a quarter of a mile of an existing surface car or existing bus line.

New York City—Including the five boroughs this city has increased 14.3 per cent in population in the ten-year period from 1918 to 1927, inclusive.

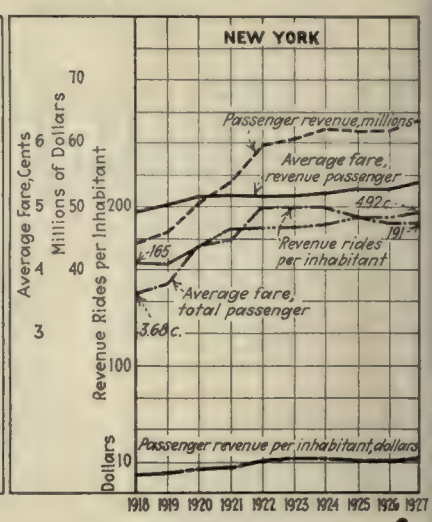
During this decade there has been a tremendous in-



New York—Annual revenue rides and vehicle-miles per inhabitant



New York—Transportation data for ten-year period. Surface cars, buses and rapid transit lines



New York—Transportation data for ten-year period. Surface cars and buses only

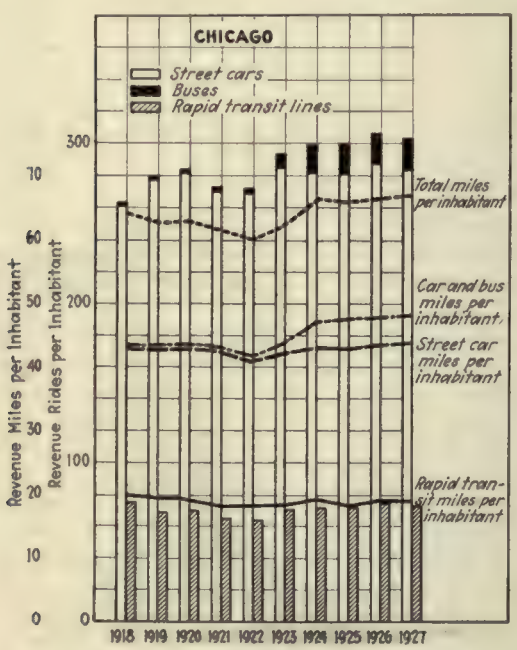
crease in rapid transit service, the rapid transit miles operated annually having gone up from 194,677,252 to 301,962,385, or an increase of 55.1 per cent. The rapid transit rides have increased from 1,029,165,648 in 1918 to 1,830,189,949 in 1927, or 77.9 per cent. The rapid transit car-miles have increased from 35.8 to 48.6; thus the service rendered has gone up faster than the increase in population by 35.8 per cent.

The surface riding on street cars and buses went up from 896,357,944 revenue passengers to 1,029,464,822 in the years 1918 to 1921, or about 44,000,000 each year. In the six years since 1921, a period of rapid expansion in bus service, the total revenue rides on surface facilities increased only about 26,000,000 yearly. Only in the first two years of this six-year period was there any increase in street car passengers. Since 1923 they have decreased 57,397,487, or at an average rate of more than 14,000,000 annually. Total revenue and transfer passengers on all surface facilities increased 85,558,268 between 1918 and 1927. During the same period the total passengers carried by street cars decreased 60,111,885 while total bus passengers increased 145,670,153.

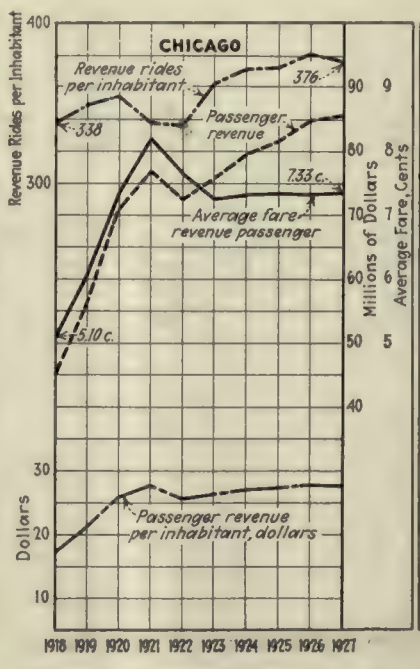
Chicago—Like New York, Chicago is served by rapid transit, street cars and buses. The population has increased 18.3 per cent since 1918. The total revenue passengers carried have increased 31.5 per cent.

There were 548 miles of street traversed by street cars and 111 miles of street traversed by buses in 1927. The street railway company, known as the Chicago Surface Lines, operates one feeder bus line 1.5 miles long and the Chicago Motor Coach Company operates 23 routes. Ten of the latter routes provide crosstown or feeder service. The other thirteen reach the Loop District.

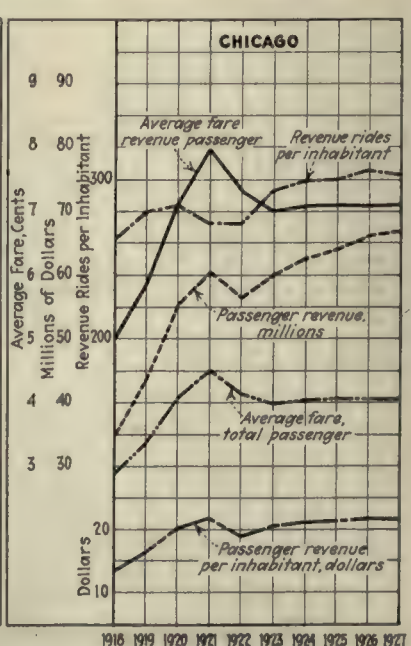
There are 1,092 miles of street car track operated in local service. Nearly all of this is double track, so the 548 miles of street are equivalent to 547 miles of two-way service. The 111 miles of street traversed by buses are equivalent to 109 miles of two-way service.



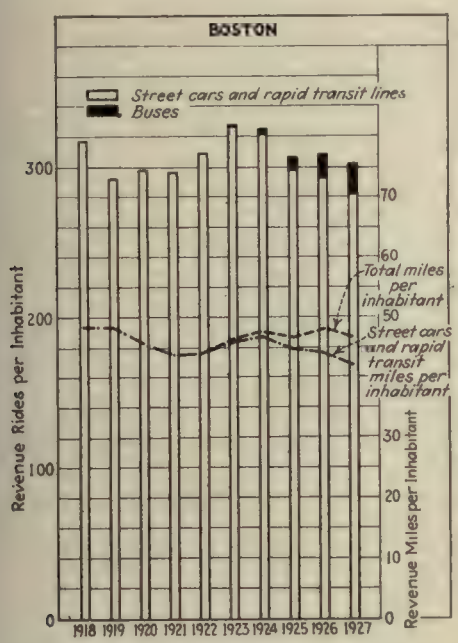
Chicago—Annual revenue rides and vehicle-miles per inhabitant



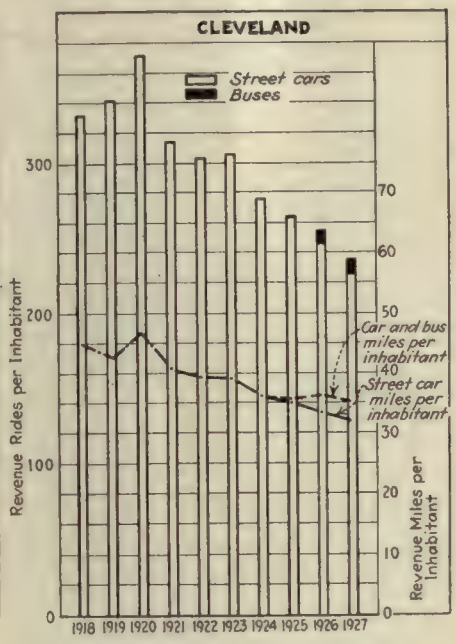
Chicago — Transportation data for ten-year period. Surface cars, buses and rapid transit lines



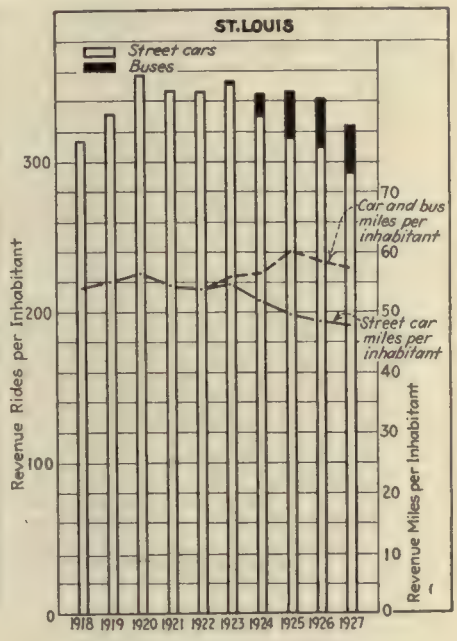
Chicago — Transportation data for ten-year period. Surface cars and buses only



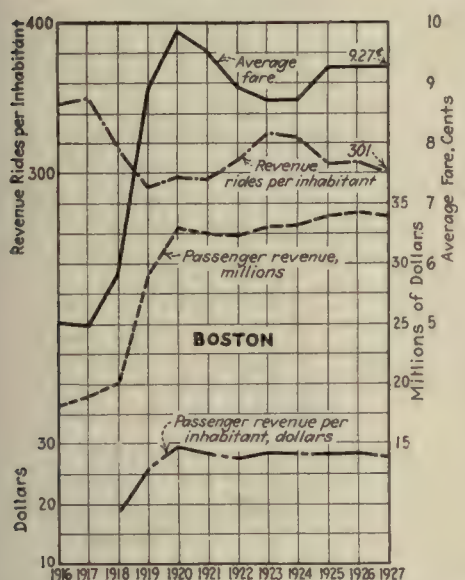
Boston—Annual revenue rides and vehicle-miles per inhabitant



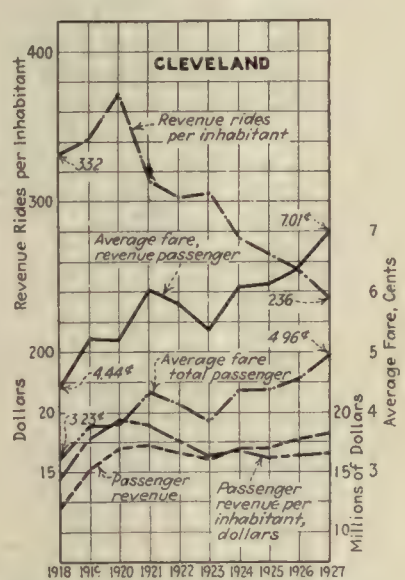
Cleveland—Annual revenue rides and vehicle-miles per inhabitant



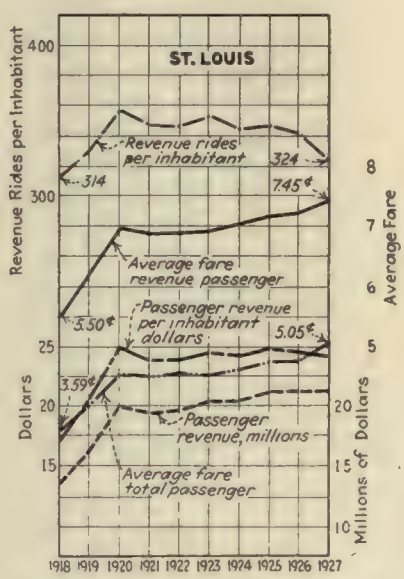
St. Louis—Annual revenue rides and vehicle-miles per inhabitant



Boston—Transportation data for ten-year period. Surface cars, buses and rapid transit lines



Cleveland—Transportation data for ten-year period. Surface cars and buses only



St. Louis—Transportation data for ten-year period. Surface cars and buses only

Unlike New York, the rapid transit service has not kept pace with the increase in population, the rapid transit car-miles per inhabitant having dropped from 20.21 to 18.73, while the rapid transit revenue rides per inhabitant have practically remained stationary, being 75 in 1918 and 73 in 1927.

The street car service, measured in car-miles per inhabitant, has kept pace with the increase in population, remaining at a figure close to 43 miles during the entire period. The revenue rides per inhabitant on the street cars have increased from 261 to 284. From 1923 to 1927 the riding habit on the street cars has remained practically constant at 284. The bus has increased from eight to nineteen.

In 1918 the street cars carried 685,300,718 revenue passengers; in 1923 they carried 824,850,103; and in 1927 some 881,958,647. The buses carried 21,919,399 revenue passengers in 1923 and 58,583,572 in 1927.

The street car fare is 7 cents with three tickets for 20 cents. There is a universal free transfer between car lines. The railway bus line has the same fare as the car line and interchanges transfers.

The fare on the Chicago Motor Coach lines is 10 cents, the lines being divided into three separate groups—north, west, and south side divisions. An additional 10-cent fare is required when transferring from one group to another. Free transfers, however, may be made between each group and the downtown shopping lines. The average revenue fare of street car and bus passengers was 7.10 cents in 1927.

The average rate of increase for street car riders was approximately 4 per cent per annum prior to 1923. After this, with increased bus activity, this rate dropped to about 1½ per cent per annum.

Boston—This city also has rapid transit lines in addition to street cars and buses, but unlike New York and

Chicago all facilities are operated as one comprehensive system with a universal transfer privilege between the different classes of service.

The increase in the number of revenue passengers carried from 1918 to 1927 inclusive has been but 5.2 per cent, with a population increase of 11.1 per cent. There is no segregation between street car and rapid transit passengers, so the relative number of the two types cannot be determined. There are 26 bus lines operated, of which only one might be considered as not being a feeder line. The local character of these bus routes may be inferred from the fact that their average one-way length is just a little over 2 miles.

There have been practically but five years of bus service. In 1923 but 465,391 bus-miles were operated, while in 1927 some 5,562,766 were run. In spite of the increased facilities that the bus has offered, the total annual revenue passengers for the system have dropped from 382,149,697 in 1923 to 366,938,908 in 1927. The combined street railway and rapid transit revenue passengers reached their peak in 1923 with some 380,002,806. This dropped to 343,490,089 in 1927.

The fare is 10 cents, with free transfers between street cars, rapid transit and buses. In some of the outlying districts local rides may be had at the rate of five tickets for 30 cents with no transfers. There are also some 5-cent bus zones with no transfers. The average of all fares in 1927 was 9.27 cents.

The riding habit, as indicated by the total revenue rides per inhabitant, was 328 in 1923 and 301 in 1927, a decrease of 8 per cent. A portion of the indicated decrease for 1927, compared with 1923, is due to the average rate of fare increasing from 8.71 to 9.27 cents, or 6.4 per cent since 1923. Another factor for the decrease is a change in method of accounting for revenue passengers, subsequent to November, 1924. Nevertheless, the enormous increase in bus-miles reflects no corresponding increase in the total passengers or the riding habit.

Cities Not Served by Rapid Transit

The element of rapid transit, in cities so served, is likely to cause the results in the surface riding to vary considerably. The extension of rapid transit lines may reduce the riding on surface lines because former car patrons use the new facility. On the other hand, rapid transit lines may develop outlying territory so rapidly that considerable local riding will develop on the surface lines with it.

Various disturbances, such as strikes and fare changes, may cause a temporary shift from rapid transit to surface lines and vice versa, as for example during the subway strike in 1926 in New York City. Although service was maintained on these rapid transit lines, it was used but little and the street cars and buses enjoyed a temporary influx of riding. It is things like this that make it desirable to study changes in the trend where buses have been added in cities that are dependent entirely upon surface lines for their mass transportation.

Accordingly, in considering the effect of bus operation on the street car riding in cities where no rapid transit lines operate, such well-developed communities as Cleveland, St. Louis, Baltimore, Cincinnati and Richmond, where complete statistics were available, have been selected for analysis.

Cleveland—This city of more than 1,000,000 increased its population 35.1 per cent from 1918 to 1927. In the latter year 196 miles of street were traversed by street cars in Cleveland and 63 miles by buses. Buses were introduced three years ago, and now give 9.0 per cent of the service and carry 4.3 per cent of the passengers, and are beginning to be a factor in the city's transportation service. All of the bus lines are operated by the Cleveland Railway. The railway owns 1,456 street cars and 157 buses.

Of the 63 miles of street covered by bus lines, some 15 miles are operated on a car line street or parallel to a car line within ¼ mile, and for distances a mile or more in length. The major route, operated with double-deck buses, competes with car lines for its entire length.

The riding on the cars and buses has not kept pace with the population; in fact, the total rides are 4 per cent less than they were in 1918. In 1924, the year before bus operation was introduced, the street cars carried 279,917,221 revenue passengers. In 1927, after three years of bus operation, the revenue rides, including both street car and bus, dropped to 262,314,932, of which the bus carried 11,296,027 and the street car 251,018,905, a loss of 28,898,316 to the street car. In 1927, fewer passengers were carried per vehicle-mile operated than at any time in the past ten years, the street cars averaging but 7.08 and the buses 3.21 passengers per vehicle-mile.

The street car fare is 7 cents with eight tickets for 50 cents and a 1-cent charge for transfers. The bus fare is 10 cents with free transfers to street cars. Transfer may be made from car to bus for an initial 10-cent fare. The average of all revenue fares collected in 1927 was 7.01 cents, which was the lowest of any of the five cities discussed herein that have surface transportation only.

The surface system in Cleveland has undoubtedly reached the stage where rapid transit is a necessity in the city plan, if the best results are to be obtained in the future. At any rate, the combined service of the street car and bus have failed to render the enlarged population the same degree of service measured by the riding habit as the street car alone gave formerly, the revenue rides per inhabitant having fallen from 332 in 1918 to 236 in 1927, or 28.9 per cent.

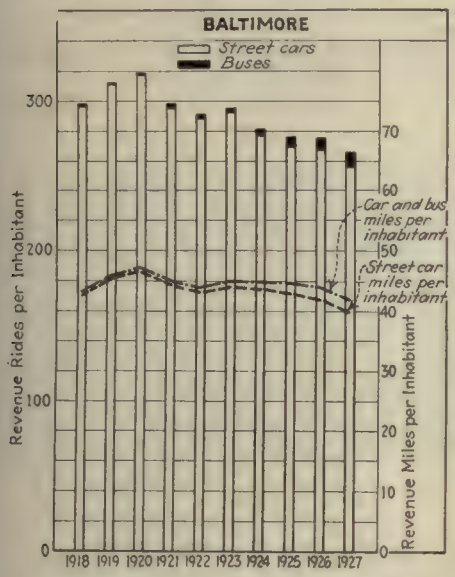
St. Louis—A 12.5 per cent increase in population is shown by St. Louis since 1918. Its industries are well diversified so its business fluctuations are not marked. Its downtown streets are less favorable for parking of private automobiles than Cleveland's. In the period from 1918 to 1927 the revenue riders have increased 16.4 per cent.

In 1927, street cars operated upon 240 miles and buses on 101 miles of street. In all there are 24 bus lines, of which seven are operated by the St. Louis Bus Company, a subsidiary of the St. Louis Public Service Company, which operates the railway lines. The other seventeen routes are operated by the People's Motor Bus Company, an independent company. The latter carries about 80 per cent of all the bus passengers.

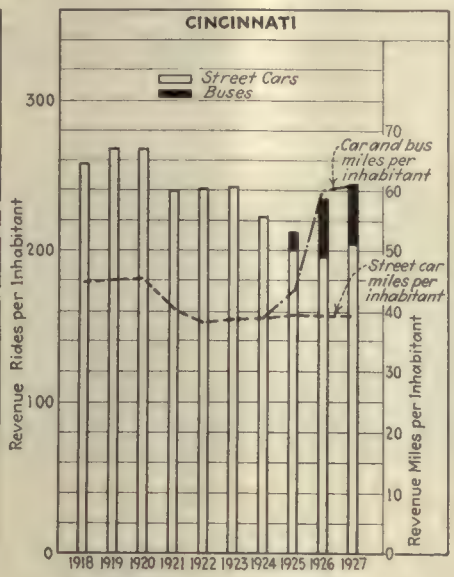
Of the 101 miles of street traversed by buses there are 63 miles which operate on car line streets or within ¼ mile of a car line, transporting passengers in the same general direction. The other 38 miles of bus line streets are, with few exceptions, in the outlying districts.

The car fare is 8 cents with two tickets for 15 cents. The fare on all bus lines is 10 cents. The street railway buses transfer to the street cars and the street cars transfer to these buses on payment of a 10-cent fare. The average fare collected in 1927, including all bus fares, was 7.45 cents. In 1923, the year the buses commenced operations, it was 6.92 cents.

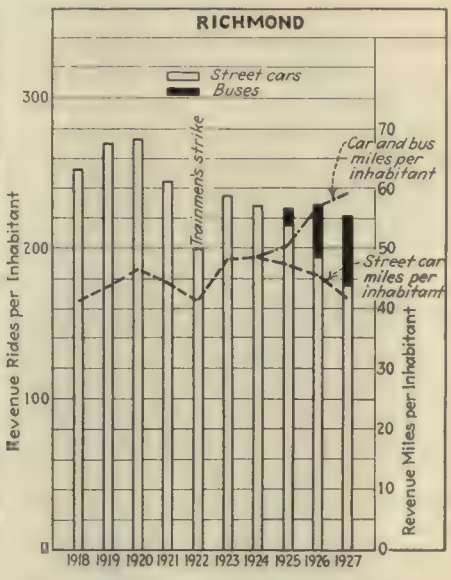
The peak of riding habit was reached in the abnormally high year of 1920 with 358, and was closely



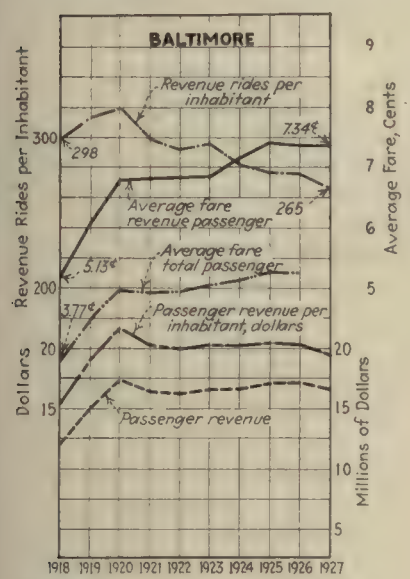
Baltimore—Annual revenue rides and vehicle-miles per inhabitant



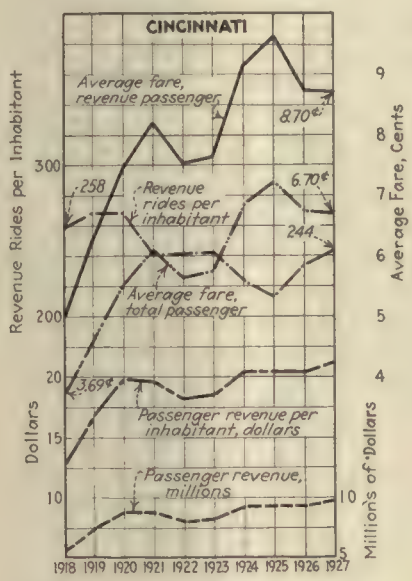
Cincinnati—Annual revenue rides and vehicle-miles per inhabitant



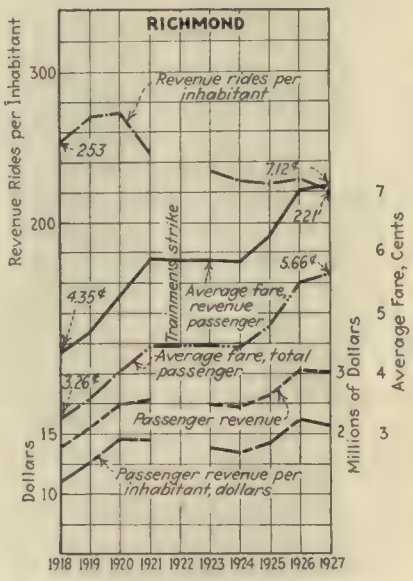
Richmond—Annual revenue rides and vehicle-miles per inhabitant



Baltimore—Transportation data for ten-year period. Surface cars and buses only



Cincinnati—Transportation data for ten-year period. Surface cars and buses only



Richmond—Transportation data for ten-year period. Surface cars and buses only

approached in 1923 with 354 rides per inhabitant. The latter year marked the beginning in a small way of bus operation. The scope of bus operation increased in five years from nothing to 16.8 per cent of the total mileage, carrying 9.5 per cent of the total revenue passengers in 1927. In 1927 the street cars carried 6.15 and the buses 3.21 revenue passengers per mile operated. In 1923 the buses carried 2,732,714 passengers out of a total of 295,404,495. Four years later, in 1927, when buses were carrying 27,296,000 passengers, the total dropped to 286,106,976, leaving a net loss to the street cars of 33,860,805 passengers, or more by 6,564,805 than the buses carried. It appears that rapid transit is necessary to St. Louis before an upturn in the riding habit to what it was in 1923 can be established.

Baltimore—With an increase in population of 11.5 per cent, Baltimore is one of the few cities that has had bus operation throughout the period under study. In 1918 buses carried about 1 per cent of the passengers. They now carry 3 per cent and render 5 per cent of the total mileage.

Some 219 miles of street are traversed by the car lines and some 30 miles by buses. All buses, with the exception of one line, are operated by the Baltimore Coach Company, a subsidiary of the local railway company. The statistics are for this company only.

Considering bus lines that operate within ¼ mile of the street car lines and carry passengers in the same general direction as competitive, some 10.5 miles of the street traversed by buses, of the total of 30 miles, are competitive. This competition is in the more thickly populated areas. These bus lines as a rule do not operate on the same streets as the car lines but are one block or more distant.

With an increase from 32,920,722 car and bus-miles operated in 1918 to 35,790,497 in 1927, the total annual revenue rides have dropped from 228,785,323 to 226,534,188; or to put it another way, with the amount of service per inhabitant measured in car and bus-miles remaining about the same (i.e., 42.92 in 1918 and 41.86 in 1927), the revenue rides per inhabitant have dropped from 298 to 265, or 11.1 per cent.

In 1927 the street cars carried 6.44 and the buses 4.32 revenue passengers per mile operated.

The street car fare was 8 cents in 1927, with two tickets for 15 cents. The fare on feeder bus lines transferring to street cars is the same as the street car fare. Two lines operating with double-deck buses into the downtown section charge a 10-cent fare. One bus line which duplicates car service has a 7-cent fare. Several of the feeder lines are zoned and charge various rates for each zone. The average rate of all fares was 7.34 cents in 1927.

Cincinnati—Cleveland, St. Louis and Baltimore are representative cities of about 1,000,000 population with surface transit only. Cincinnati gives us an opportunity to study a slightly smaller city, but one with many major traffic problems because its avenues of ingress and egress are limited by the closely surrounding hills. It is of particular interest here because in three years bus operation has increased from nothing to 29.7 per cent of the total mileage operated, carrying 16 per cent of the revenue riding. There are now 149 miles of street traversed by street cars and a total of 123 miles of street traversed by buses.

In all there are 24 bus lines, of which nine are operated by the Cincinnati Street Railway and fifteen by various independent bus companies. Of the nine lines operated by the railway company, five are either cross-town or feeder lines while the other four operate an express service with limited stops for a distance of 2 or 3 miles from the business center. All of the fifteen independent bus lines reach the downtown terminal at Fountain Square. All but four compete with the street car for more than half the length of their route.

There are 200 street cars operated daily during the base hours and 590 during the maximum rush hour. There are 118 buses operated during the middle of the day and 144 during the maximum rush hour. Practically all of the rush-hour extras are on the Cincinnati Street Railway bus lines.

The street cars in 1918 carried 112,400,000 passengers; in 1927 they carried but 94,006,310, the other 18,393,690 being carried by the buses. In order to maintain the volume of traffic, 7,630,000 bus-miles were run in 1927, bringing the total surface mileage up from 38.97 miles per inhabitant in 1924, before bus operation, to 55.77 miles in 1927. The revenue passengers per mile operated in 1927 show an average of 5.22 for the street cars and 2.36 for the buses.

The car fare is 10 cents with three tickets for 25 cents. The bus fare is 10 cents, but some of the longer lines have additional zone rates. The street railway buses transfer to the street cars and the street cars transfer to these buses on payment of a 10-cent fare. The average of all fares was 8.7 cents in 1927, which is the highest rate of any of the five cities with surface transportation only. In spite of this, the riding per inhabitant is now within 95 per cent of what it was in 1918.

During the period from 1918 to 1927 Cincinnati has increased in population 5.6 per cent, while the service rendered, measured in car and bus-miles, has increased 31.4 per cent. In other words, the service has increased more than five times as fast as the population while the total number of revenue riders has actually dropped from 112,400,000 to 112,006,310. It is evident that rapid transit must ultimately be resorted to if the local transportation system is to function to the best advantage to the community. A project of this nature is already partially constructed.

GROWTH OF TRANSPORTATION BY STREET CARS AND BUSES IN THE CITIES OF CLEVELAND, ST. LOUIS, BALTIMORE, CINCINNATI AND RICHMOND FOR THE TEN-YEAR PERIOD OF 1918 TO 1927, INCLUSIVE

	1918	1927	Per Cent Increase
Population	2,971,534	3,499,707	17.77
Revenue Passengers:			
Street cars	899,555,560	856,200,052	4.82*
Street cars and buses	901,506,355	929,329,326	3.09
Revenue-Miles Operated:			
Street cars	138,044,545	137,487,168	0.40*
Street cars and buses	138,395,361	162,325,183	17.30
Revenue Rides per Inhabitant:			
Street cars	302	245	18.87*
Street cars and buses	303	266	12.21*
Revenue-Miles per Inhabitant:			
Street cars	46.46	39.28	15.45*
Street cars and buses	46.57	46.38	0.41*
Revenue Rides per Mile:			
Street cars	6.52	6.23	4.45*
Street cars and buses	6.51	5.73	11.98*
Per Cent of Revenue Passengers:			
Street cars	99.00	92.00	.....
Buses	1.00	8.00	.....
Per Cent of Revenue-Miles:			
Street cars	99.00	85.00	.....
Buses	1.00	15.00	.....

*Decrease.

Richmond—In the period from 1918 to 1927 inclusive Richmond's population has increased 17.8 per cent. A large amount of bus service has been introduced within the past three years. In 1927 buses operated 29.6 per cent of the mileage and carried 20.6 per cent of the total revenue passengers.

All street cars and buses are operated by the Virginia Railway & Electric Company, which has seven bus routes. Only one competes directly with a car line. Aside from the three feeder lines in outlying territory, all of the buses operate on or parallel to car lines for some portion of their route.

The car fare is 7 cents, with transfers to buses 1 cent. Bus fare is 8 cents with transfers to car free. The average rate of fare was 7.12 cents in 1927.

During the three years of bus operation, the total revenue bus-miles have increased from 619,700 to 3,359,409, bringing the total of all transit up to 11,344,286 in 1927, or some 68.8 per cent more than rendered in 1918. In the face of this, however, the revenue rides per inhabitant have declined from 253 in 1918 to 221 in 1927, or 12.6 per cent. In 1927 the street cars carried 4.21 while the buses carried 2.59 revenue passengers per vehicle-mile.

The Five Surface Transit Cities Combined

To determine average conditions for the cities in which street cars and buses give all of the transportation service, the accompanying table has been prepared to show the combined population, revenue passengers, miles operated, and other similar factors for Baltimore, Cincinnati, Cleveland, Richmond and St. Louis, for 1918 and 1927.

The total miles operated, street car and bus, have increased from 138,395,361 to 162,325,183 in this period, a jump of 17.3 per cent in service which has practically kept pace with the 17.8 per cent increase in population. The total riding has increased but 3.09 per cent, or less than one-fifth of the per cent of population increase. This is in the face of the fact that bus mileage operated is responsible for an increase of 17.3 per cent in the service.

While the total service per inhabitant operated in 1927, viz., 46.4 vehicle-miles, is practically the same as in 1918, the total riding habit or revenue rides per inhabitant has dropped from 303 in 1918 to 266 in 1927. The buses are now carrying 8 per cent of the revenue riders and furnishing 15 per cent of the miles operated; or putting it in another way, the buses are carrying on an average 2.94 and the street cars 6.23 revenue passengers per vehicle-mile operated.

New Corps of Co-ordinated Transportation Supervisors Created By P.R.T.





New group of co-ordinated P.R.T. supervisors and starters, and their badges



Special group of men in the downtown district to direct movement of all forms of public transportation operated under Mitten Management

ANOTHER step in the direction of a more closely co-ordinated system of transportation was taken by the Philadelphia Rapid Transit Company when, on Dec. 1, 31 picked men donned well-tailored, special French-blue uniforms and took up their posts in the central business district of Philadelphia as supervisors of all the forms of surface transportation under Mitten Management. With them went six starters, making a group of 37 men upon whom will rest the responsibility of expediting the progress of trolleys, buses and taxicabs through the narrow, crowded streets of Philadelphia's downtown area.

These men have been taken from the supervisory forces for all three groups—street cars, buses and cabs—and have been selected because of their proved ability, experience and physical fitness. Each is a qualified operator of every type of P.R.T. vehicle; all are young men, capable and earnest.

With the creation of this corps of co-ordinated supervisors, these advantages will be realized more fully than ever before. Special events, such as athletic contests or other large gatherings necessitating the co-ordination of special transportation facilities of all forms, will find representatives of the new group on the job, directing street cars, buses, taxicabs and private automobiles—speeding up traffic for everyone.

They will prove especially valuable in emergencies—tie-ups, fires, parades, street accidents, snowstorms and all of the other causes contributing to traffic delay. At such times they will co-operate with the police in every way possible to accomplish the objective common to both—the acceleration of traffic through overburdened streets. To further this co-operation between the new co-ordinated supervisory group and the police traffic squad, the men have all been sworn in as special police officers.

The territory for which these men are responsible extends from Spring Garden Street to South Street and from 34th Street to the Delaware River. Outside of this central area, the regular supervisors of each division of the system will continue to direct their own transportation facilities, for here there is not the overlapping of all transit mediums that there is downtown. These supervisors will report to their division managers, as formerly, while the new group will report to an official directly responsible to the vice-president in charge of operation.

The creation of this organization comes at a time when public attention is focused on the problem of traffic congestion, for P.R.T. is now conducting its annual "80 per cent Campaign." This campaign, which takes its name from the fact that 80 per cent of the riding public in Philadelphia uses P.R.T. lines and has at its slogan "Give the 80 per cent a square deal," is an effort to bring the traffic situation to public attention and to acquaint the car rider with the actual causes of traffic delays.

Boston Bids Farewell to Old Dobbin

NO LONGER will the familiar sight of a tip cart, express wagon or other vehicle bearing the name "Boston Elevated Railway" and drawn by sleek-looking horses be seen on the streets of Boston, for on Oct. 13, 1928, the last of the horses owned by the railway, 23 in number, were replaced by motor vehicles. This, of course, is no surprise to anyone, because, just as electric cars replaced the old horse cars in providing quicker and more economical transportation for passengers, the motor vehicle has made it possible to transport material more rapidly and economically.

In connection with the passing of the old faithful horses, some of which have been serving the road for more than fifteen years, it is interesting to note that at one time 7,728 horses were required to haul the cars and other railway equipment. That was back in 1887, when the West End Railway was organized to take over the many independent horse car lines in and about Boston. These horses had a value of $1,035,552 and were housed in 37 separate stables. As the lines were gradually electrified, the number of horses was correspondingly reduced, so that when the last horse car line was abandoned in 1900 the railway owned only 487 horses.

Electric cars for the transportation of rails, sand, coal and other material came into use, with the result that in 1915 the railway owned but 230 horses. It could readily be seen that it was only a question of time when the

horses would be entirely displaced, and for that reason no horses have been bought by the railway since 1918, when two were purchased.

The first large scale adoption of motor vehicles went into effect in 1920 in the miscellaneous departments, when 40 trucks and passenger cars were purchased for the use of the emergency crews, for switch repair trucks and for the convenience of track masters and other subordinate officials. Each vehicle replaced two or more horses. This practice continued until in 1927 only 23 horses remained and all the stables were closed, except the one at Lenox Street where these horses were quartered.

Modern Equipment Essential to Success

By Ross Schram

Vice-President in Charge of Sales Twin Coach Corporation, Kent, Ohio

PEOPLE are going to continue to buy automobiles. No one can stop them. Two and one-half million born every year want them almost as soon as they are conscious of the thrill of riding. But with all the sales of motor cars, railway people are getting 75 per cent of the public riders in the large cities and more than 50 per cent in the smaller cities. The average fare is slightly more than 8 cents today and is slowly climbing. Now, if you have a monopoly to all intents and purposes on 75 per cent of the public traffic (50 per cent in the smaller communities) and there are available 2,000,000,000 miles of service annually, what result is obtained by multiplying this figure by the accredited 8 cents a mile saving with 50 per cent modern equipment, or 16 cents a mile with 100 per cent modern equipment? Finishing this theoretical example only halfway with 50 per cent new equipment, the answer is $0.08 multiplied by 1,000,000,000 or $80,000,000, the price of 6,000 new street cars. The industry's entire budget for 1928 has been estimated at $246,000,000, a third of which could be secured from new equipment savings.

The author, speaking at the December meeting of the New England Street Railway Club, points out that the electric railway industry has not gone nearly far enough in the adoption of modern light-weight rolling stock.

Carrying this hypothetical earning a bit further, what about modern tools and shop practices? The cost of labor is fairly fixed, but why should one company have a pull-in record so much better than those of other companies? Why, when I read the minutes of a maintenance superintendent's association, should I find a discrepancy of 100 per cent in trolley wheel wear; or discrepancies in the cost of handling armatures; or that some do not believe in power meters; or astonishing differences on the theory and time of inspection and overhaul?

The keynote of the 1928 American Electric Railway Association convention was "No more delay on modernization"—the post-convention issues of the trade journals editorialized on this theme. It will be seen soon in 1929 whether the attempt for full speed ahead is a sincere one. If there ever was a time when the saying "Waiting is wasting" was true it is right now in the great American urban railway industry. It is not possible to point out a single field where there is greater opportunity to stand out above the rank and file than in this industry.

In days gone by they hung bells on car horses to warn folks to get out of the way. The operation was so relatively quiet in those days that one might be run down by a horse car. In the early electric days the trolley was the fastest urban transportation. Consider the change to the period when they became the noisest and slowest vehicles on the street. The speed factors are being attained today, but how late? Again, where can a man on his toes find a greater field of opportunity? Is it rust, lack of perspective, under-pay, or lack of capital that has caused this situation to accrue? Is it the drag of system versus city political conflict that has been the anchor? What has caused this industry to lag so far behind the other industries in modern practices? Has there not been just a little too much self-pity? Don't think for one minute the other fields which have shown great advances have lounged in beds of roses.

Concede that you still have 75 per cent of the public riders. In almost any field that would be considered a good percentage, and most folks would be happy with that ratio. Perhaps if the profits are forced by cutting the costs, it will still seem a good healthy percentage of business. Leather seats and rainbow paint will never be enough. The industry must force its profits through reduced costs based upon the use of modern tools. This is true merchandising.

This forcing of cost brings us back to street car manufacturers. You desire lower-priced units. Consider the varying specifications for street cars. Is it any wonder that costs do not come down? In passing, what has been done by the field as an industry in conforming with the recommendations of the committee on unification of car design, born in 1921—seven long years ago?

Is the bus industry subject to some of the criticism which has been aimed at the track industry? If so, it does not deserve criticism from the same standpoint. In 1924, bus transportation was well under way and operators had more traffic in many cases than they could handle. The bus manufacturers were kept busy, but not too busy to develop many new ideas in bus construction. Every one of these advancements was given to the traveling public before the public realized that it required the same. The traction industry has fallen down by not anticipating the public demands in the way that the great automobile industry determines by very exhaustive research what is best for the public.

For 20 to 25 years that part of the electric street car with which the lay public was familiar in most cities changed only in the way of additional structural strength and capacity. A very striking contrast exists in the design of street cars and some of the modern motor coaches, which have been increased in capacity to hold practically the same number as the average street car, at the same time reducing the weight 30 per cent. On the other hand, during the past decade or two, as the street car body increased its capacity it also grew in weight. Here is a good illustration of industrial science versus industrial—what should it be called?—stagnation.

The time is here now for the railway industry to follow the light-weight design of the school whose vehicles have been responsible for its most severe competition. Likewise, the automotive field can benefit immensely in its efforts to handle peak-load transportation from the lessons learned in 40 years of railway operation.

Factors Contributing to

Effective, Economical Bus Maintenance

By Adrian Hughes, Jr.
Superintendent of Bus Transportation
The United Railways & Electric Company of Baltimore
Baltimore, Md.

Adequate, well-equipped shop buildings, an efficient organization, a carefully-arranged inspection system and co-operation between the maintenance division and all other divisions are listed by the author in this article, prepared for presentation before the Metropolitan sections of the A.E.R.A. and the S.A.E., as the four principal factors for efficient maintenance

GOOD maintenance is absolutely essential to good service, and efficient, economical maintenance has a large influence on net profit. The maintenance of buses is merely one phase of operation but an important one, and although it is influenced by the other phases it likewise influences them to a great extent.

Some of the principal factors contributing to effective, economical maintenance are the following: First, there must be adequate, well-equipped shop buildings, providing the space and facilities necessary for proper storage, inspection and repairs; second, there must be an efficient maintenance division made up of skilled and trained mechanics and shop men, headed by a competent supervisor; third, there must be a carefully arranged inspection system, systematically adhered to; fourth, there must be a practical means of co-operation between the maintenance division and all other divisions of the bus operating organization, that is, there must be a management which will act to co-ordinate the work of the entire organization in order to secure the most satisfactory service at the lowest possible cost.

The most important of these factors is the last-named —co-operation. It is difficult to segregate from the entire organization the part which can be considered solely responsible for maintenance. Where does the maintenance organization start? Where does it end? It seems necessary to include the entire bus organization in fixing the responsibility for this one phase. It includes the management, the office division, the operating division, the garage and shop division, and even the selling division. The work of these various divisions must be properly co-ordinated for satisfactory maintenance results. Each of the division organizations must know something of the work of the other divisions and have a comprehensive idea of the general organization, so that they will know where their work fits in with the whole.

The bus operation of the Baltimore Coach Company is entirely a city service but with a continually growing special bus business, made up of sightseeing, touring and chartered service. The equipment consists of 107 buses. Fourteen of these are 55-passenger, semi-inclosed, double-deck buses. The remainder are all single-deck buses, 25 or 29-passenger, and of the standard pay-enter city type, with the exception of a few coaches assigned to the special bus business and sightseeing, operated under the Gray Line Association membership. In addition to these buses, the Baltimore Coach Company maintains 38 trucks and 24 automobiles used by the railway.

Two Garages Serve the System

The storing and maintenance of the buses is provided for at the present time by two garages, each with a shop. The Charles Street garage, centrally located, takes care of the storage and maintenance of 61 buses which operate on seven routes, the storage and maintenance of all the automobiles and the maintenance of all the trucks. The Fleet Street garage is located in the eastern section of the city and takes care of 46 buses operating on four routes. There is a foreman at each garage. The shop forces consist of 52 shopmen and sixteen cleaners and janitors.

There is no general repair shop for the buses, the shop at each garage taking care of the maintenance of the vehicles which operate from it, but there is a certain amount of specialization between the two shops. At the Fleet Street shop all of the major body work, upholstery work, battery work and radiator repair work is done. At this shop also is located the oil reclaiming plant. At the Charles Street shop is located the modernly equipped spray paint shop where all of the bus painting is done. This shop also does most of the unit overhauling work on engines and all special machine and electrical work.

Too much emphasis cannot be laid on the importance of inspection for satisfactory maintenance. Careful and competent inspection is essential not only to insure satisfactory and uninterrupted service but also to keep the cost of maintenance at a minimum. Written reports or defect cards from the chauffeurs form an important part of the inspection system. To insure that they will not fail to report defects, a daily report is required whether a vehicle is defective or not. The interest of the chauffeurs must be kept up so that these reports will be filled



The satisfactory appearance of buses can be obtained best by a daily shower bath with a scrubbing by soft brushes

out intelligently and not in a perfunctory manner. They are of great aid in guiding the maintenance division and preventing small defects from growing into costly repair jobs. Properly carried out, they take the place of frequent inspection periods in the shop which keep buses out of service and interfere with useful shop work.

Inspection for crankcase oil changing and for general lubrication is made every 1,000 miles with some variation for special cases. Lubrication is of the utmost importance. Inspection of the entire bus to detect defects and to make repairs or replacements is made every 2,000 miles. The periodical general inspections are indicated by a small card placed in a holder on the dash of each vehicle. A comparison between the mileage indicated on this card and the speedometer reading, as buses are stored each night, furnishes a ready means of picking out those which are due for inspection. This method has worked out well and eliminates the necessity of keeping a separate record of the regular inspection periods.

Brakes are perhaps the most important part of the operating mechanism on a bus, because good brakes are necessary to insure safety as well as service. Their care also contributes materially to the cost of maintenance. It has been found that a brake tester not only reduces the cost and time required for inspecting and servicing brakes but adds to the reliability. A brake-testing device is just as important as an engine-testing device.

Another important element of maintenance is cleaning. The satisfactory appearance of buses, with the least damage to paint, can best be obtained by a daily shower bath with a scrubbing by soft brushes, requiring about three minutes for each vehicle. A spray apparatus, composed simply of two upright pipes providing a spray through which the bus is moved, has been found just as satisfactory as a more elaborate spray rack, because the bus has to be moved in and out of the wash rack with any type, so that no additional time is consumed in the use of the simpler apparatus. Chassis and running gear should be cleaned about once a week with a high-pressure cleaning compound spray using steam or air. Engines and radiators should be cleaned once or twice a month in the same way. A clean engine is not only a great aid to inspection but it also prevents many minor troubles.

Important to Keep Buses Earning

The object of all this effort is to keep buses in service, because it is only then that they are earning money. This is accomplished by catching up small defects through these various inspection methods and by the use of the unit repair system. Interference with useful revenue work during busy seasons is minimized by scheduling certain major repair work to fit in with the seasons of least activity. Careful attention is given to such important details as specialization of mechanics, the application of labor-saving tools, the use of high-grade parts and materials, and the salvaging of usable material. Care also is taken to procure accurately such data and records as are necessary. Clerical work required by chauffeurs and shopmen is kept at a minimum, but it is most important that this information be turned in accurately as the entire value of the accounts and statistics depends on the accuracy with which the original data are secured.

These and many other shop practices and methods are important elements of good maintenance. The shop practices of this property are considered modern and up to date, but it is unsafe ever to become too well satisfied. Constant study and analysis of the methods and results must be continued and changes tried out. The study of articles about other properties, or better still, visits to other properties, is of great help in bringing about improvements that add to efficiency and economy.

Cost figures for this property might be of interest, although it is misleading to make comparisons of the cost per mile of operation between different properties, because of the variations in the many factors affecting these costs. A statement of revenue and expenses showing the general accounts in total cost per year and in cost per mile comparatively for three years is given in Table I.

The maintenance cost of this fleet of buses should make an interesting comparison with the average city operation that has been running for some time, because none of the equipment is new and should therefore represent a fair average over a long period. The newest buses in this fleet are a group of twenty which are three years old. The oldest buses are a group of 32 which are more than six years old, and the average age for the entire fleet is approximately 4½ years.

The total average cost of this bus operation, including the general expenses of the Baltimore Coach Company, all fixed charges and charges from the claim and other departments of the railway which do work for the coach company, for the year 1927 was 35.7 cents per mile. This compares with 37.8 cents in 1926 and 33.7 cents for the first six months of 1928. Of this figure of 35.7 cents for the cost of the operation in 1927, the maintenance of plant and equipment, as defined in the Classification of Accounts by the American Electric Railway Association, was 8.6 cents or 23.8 per cent of the whole. This does not include depreciation reserve, which was at the rate of 2.7 cents per mile in 1927.

To determine the figure of expense which is susceptible of control by the maintenance division, there should be deducted the supervision expense which is more or less fixed, garage rents of $13,500 and the tire mileage contract, all amounting to 1.9 cents per mile, but there should be added from the "Operating Garage" account the items of "Garage Employees" and "Garage Expenses" made up primarily of cleaning, oiling and various garage expenses, as these are also under the control of the maintenance division. These amounted to 1.3 cents per mile in 1927. The result is 8.6 cents less 1.9 cents plus 1.3 cents or 8 cents per mile. This figure of 8 cents per mile out of the total operating cost of 35.8 cents per mile, or nearly one-quarter of the whole, can be divided into four items: 3.6 cents per mile for the labor and material of bus chassis maintenance; 1.5 cents per mile for labor and material for bus body maintenance; 1.6 cents covering service trucks, miscellaneous shop expenses, buildings, fixtures and grounds; and the 1.3 cents per mile from the "Operating Garage" account. They represent that portion of the expense which is incurred in the garages and shops through the activities of the maintenance division. This is the actual cost of inspecting, repairing, fueling and cleaning vehicles and keeping them in a safe and satisfactory operating condition.

Determining the Proper Figure

The big question for consideration is not only what factors contribute toward keeping this figure at a minimum but also how to determine when the minimum has been reached. For any property, what should this figure be to represent an effective and economic maintenance, and who is going to be the judge when this satisfactory condition has been attained?

There is need for some practical direct method of indicating when the proper balance between the standard of maintenance and the cost of maintenance has been reached. This should not be left altogether to personal opinion. An effort has been made in Baltimore to use for a measure of the condition of the equipment in determining the proper allowance for this purpose the number of road failures or service calls per 10,000 miles of operation. This record has been frequently used to determine the degree of satisfaction of the service, but its value as an aid in determining the proper limitation of expense may not have been tried out fully. The trend of this item from month to month and from year to year should be a very positive indication of the condition of the equipment and should reflect the effect of the expense incurred for maintenance.



The spray apparatus, composed simply of two upright pipes, providing a spray through which the buses move, has been found satisfactory

The details of the shop practices and methods have been treated in brief. The following paragraphs show the effect that co-operation with the other divisions and the general practices of the whole organization have on maintenance costs and effectiveness, point out practical methods for bringing this about in a bus operating organization, and also direct attention to the possibilities of using statistics on service calls to control the expenditures of the maintenance division.

The statement has frequently been made that maintenance begins on the street. It does begin on the street with the operating forces and it involves the men in the

TABLE I—REVENUE AND EXPENSES OF THE BALTIMORE COACH COMPANY FOR 1925, 1926 AND 1927

Account	1925 Amount, in Dollars	1925 Cost per Mile, in Cents	1926 Amount, in Dollars	1926 Cost per Mile, in Cents	1927 Amount, in Dollars	1927 Cost per Mile, in Cents
Total revenue	637,149.65	37.5	688,858.54	37.3	765,811.40	38.6
Expenses:						
Maintenance of plant and equipment expenses	151,476.45	8.9	172,964.89	9.4	170,021.45	8.6
Depreciation	77,490.27	4.6	64,507.08	3.5	50,757.08	2.6
Operating garage expense	98,746.56	5.8	103,628.72	5.6	104,305.29	5.3
Transportation	170,134.03	10.0	180,402.08	9.8	200,501.76	10.0
Traffic expense	14,194.63	0.8	23,196.57	1.3	20,928.90	1.0
General and miscellaneous	73,108.40	4.3	64,877.11	3.5	67,771.74	3.4
Total operating expense	585,150.34	34.4	609,576.45	33.1	614,286.22	30.9
Taxes	51,875.64	3.1	63,635.10	3.4	69,017.74	3.5
Interest	17,664.25	1.0	24,023.40	1.3	26,296.28	1.3
Total expense	654,690.23	38.5	697,234.95	37.8	709,600.24	35.7
Net income	*17,540.58	*1.0	*8,376.41	*0.5	56,211.16	2.8
Bus-hours				248,206		
Revenue passengers				7,819,778		
Transfer passengers				1,103,313		
Total passengers				8,923,091		
Load factor, in per cent				48.4		
Speed of operation (excluding layover time)				8.0		
Mileage	1925—1,700,226; 1926—1,844,299; 1927—1,986,128					

*Deficit.



A brake tester not only reduces the cost and time required for inspecting and servicing brakes, but adds to their reliability

office. Just as the cost of maintenance is merely a part of the total cost of operating buses and is no more or no less important than any other part, so is the maintenance division just a part of the entire organization, just as important but no more so than any other part. Satisfactory functioning of the maintenance division depends to a great extent on co-operation from the other divisions of the organization. Not only must the work of each of these divisions be done as perfectly as possible, but it must be clear how and where the work of each fits in with the others. There must be frequent meetings and consultations by the supervisory forces of all of these various divisions. In fact, the success of a business or undertaking of any sort depends on the entire organization. There is no such thing as a one-man organization if there is more than one man required for getting out the work of that particular business.

The most effective way of bringing this about in Baltimore has been through the medium of weekly meetings of the entire supervisory force and the office forces. This system was found to give excellent results some few years ago in the power department of the United Railways & Electric Company and it has been just as effective with the bus company. The result of this system over a period of three years has been a constantly decreasing cost of maintenance with an improvement in the operation of equipment and a consequent increase in revenue.

These weekly meetings, conducted by the operating head of the bus company, are attended by the superintendent of operation with his street men and dispatchers, the superintendent of equipment with his shop foremen, the sales organization for the special bus business and the clerical force. The matters discussed vary from general information regarding the operation of both the bus company and the railway to minor details about a route, a bus or an individual. Financial statements for the operation as a whole and for the individual routes, various statistics on costs and accidents, results of special tests and investigations, and other information is presented and discussed. Thus each one is informed as to the general transportation situation and also acquires an understanding of the responsibility and scope of the work of the others.

Accounting is an important part of the organization work. Without a proper accounting system correctly carried out—and more important even that that, properly used—an organization is operated blindly. The statistics

TABLE II—OPERATING DATA OF SEVEN ROUTES IN 1927

	Charles Street	Chester Street	Fayette Street	Mount Royal Avenue	Monroe Street	North Point Road	Randallstown (Trackless Trolley)
Length of route, in miles	3.03	3.24	3.4	3.0	1.55	8.1	6.6
Buses assigned on peak	12	7	21	8	3	2	2
Buses assigned on base	8	4	13	6	2	1	1
One-way trips operated	113,664	71,396	148,594	90,608	37,726	15,000	18,814
Revenue passengers carried	2,306,512	1,059,367	2,373,706	841,476	234,122	219,052	276,172
Transfer passengers carried	.....	500,798	.....	.....	172,529	.....	.....
Total passengers carried	2,306,512	1,560,165	2,373,706	841,476	406,651	219,052	276,172
Load factor, in per cent	37.6	91.1	66.8	37.1	44.9	68	66.7
Cost per passenger, in cents	7.1	4.6	7.5	10.7	5.3	10.0	13.2
Average fare per passenger, in cents	10.0	4.9	7.0	10.0	4.3	10.0	8.2
Bus-hours operated	46,062	32,388	70,109	37,260	8,238	8,533	.....
Bus-miles operated	352,773	237,315	518,560	286,819	61,319	81,035	127,691
Total revenue, in dollars	231,423.88	76,710.31	166,862.98	84,713.04	17,393.71	22,090.58	22,732.55
Total revenue per mile, in cents	65.6	32.3	32.1	29.5	28.4	27.3	17.8
Total expenses, in dollars	164,278.98	72,128.58	177,631.40	90,226.64	21,662.83	21,928.73	36,495.08
Total expense per mile, in cents	46.5	30.4	34.3	31.5	35.3	27.1	28.6
Net income, in dollars	67,144.90	4,581.73	*10,768.42	*5,513.60	*4,269.12	*161.85	*13,762.53

*Deficit.

and data prepared by the accounting division are the eyes through which we see what our business is doing and what we can make it do.

The system of accounting used in Baltimore shows the cost of each individual route and each part of the operation, and from these the net profit or loss on each part. It is done quite simply by pro-rating costs on three units of the bus, the bus-hour, and the bus-miles, instead of averaging everything on the bus-mile unit, with its resulting fallacies and incorrect conclusions. The system has been indispensable in enabling us to change our bus operation from a $17,000 deficit three years ago to a $56,000 profit now. Table II is a statement of the cost of operation by routes for the year 1927, obtained by this pro-ration method and showing also other data of importance in analyzing each part of the operation.

Accounting is a great deal more than merely collecting all of the costs and all of the revenues and deriving from them the net profit. It is much more even than dividing these general costs into the classification of accounts. It must, in addition to this, provide the statistics and data which are so necessary to guide the management, the division heads, and the members of the supervisory force in the effective carrying out of their work.

Accounting plays an important part in the work of the maintenance division. Intelligent direction of that division would be difficult without statistics. Even in such things as the relative values of materials or kind of equipment, it is not safe to depend on the opinion of the shopmen. It will often be found that such opinions are erroneous and accurate data must, therefore, be collected. However, careful consideration must be given to the extent to which the statistical methods should be applied. There is a tendency on the part of almost every one to go too far, and collect so many data that it would be impossible for the management or the supervisory forces to make use of them. Table III contains statistics which are considered useful in analyzing and controlling maintenance costs.

The final control of all expenditures is effected by the use of the budget system. A budget is made in advance for each month of the mileage to be operated, the revenue to be expected, the expense to be incurred, and the net profit which will result, based upon statistics over a period of time, applied with a knowledge of existing conditions. The advantages of the budget system are well understood. It is useful for controlling expenditures and for preventing frequent and undesirable fluctuations. A comparison of the actual results with the estimated figures brings out clearly and promptly any unusual occurrences and any change in factors which affect the cost of operation. Table IV is the general budget statement for the month of October, 1928. Not only does the budget show to the accountant and to the management the allowance for each of the standard classifications of accounts, but it shows to each member of the supervisory force in detail how much money he is expected to spend in carrying out the work for which he is directly responsible. Thus, the foreman at each shop is informed



Miller oil reclaiming plant of the United Railways & Electric Company of Baltimore. Salvaging oil and other materials is an important duty of the maintenance division

TABLE III—COST OF BUS BODY AND CHASSIS MAINTENANCE BY SUB-ACCOUNTS FOR 1927

	Bodies—Account 1304	Amount	Cost per Mile, Cents
4- 1	Painting	$4,426.51	0.209
4- 2	Glazing	1,382.48	0.060
4- 3	Signs	189.17	0.008
4- 4	Fare boxes and registers	141.39	0.007
4- 5	Body repairs	11,943.92	0.565
4- 6	Batteries	3,008.07	0.142
4- 7	Generators	2,985.13	0.141
4- 8	Lamps	3,525.02	0.166
4- 9	Signalling and warning devices	1,433.15	0.067
4-10	Damage due to accidents	1,907.27	0.090
	Total of maintenance of bus bodies	$30,942.11	1.455
	Average cost per bus	278.76	
	Chassis—Account 1305		
5- 1	Engines	$16,706.88	0.790
5- 2	Springs	4,595.89	0.217
5- 3	Cooling system	3,758.84	0.177
5- 4	Transmissions	5,107.89	0.241
5- 5	Clutch	3,731.59	0.176
5- 6	Brakes	10,527.09	0.498
5- 7	Steering gear	2,960.39	0.140
5- 8	Rear axle	11,431.02	0.541
5- 9	Gasoline system	2,097.33	0.099
5-10	Frame	777.84	0.037
5-11	Wheels	5,648.95	0.267
5-12	Starters	557.00	0.026
5-13	Ignition	3,677.05	0.173
5-14	Speedometers	1,737.74	0.082
5-15	Damage due to accidents	582.94	0.028
	Total of maintenance of bus chassis	$73,898.44	3.492
	Average cost per bus	665.75	
	Average cost per bus for chassis and body	944.51	
	Total mileage	2,113,819	

TABLE IV—CONTROLLING SHEET OF THE BALTIMORE COACH COMPANY FOR THE MONTH OF OCTOBER, 1928

	Actual, 1927	Estimated, 1928	Actual, 1928
Miles	182,331.00	187,000.00	183,422.00
Bus operating revenues:			
Passenger revenue: Regular service	$56,643.13	$62,000.00	$61,447.38
Special buses	16,709.78	17,000.00	14,333.30
Total	$73,352.91	$79,000.00	$75,780.68
Other revenue from transportation	.....	.....	.....
Revenue from other bus operations	312.67	250.00	234.00
Total bus operating revenue	$73,665.58	$79,250.00	$76,014.68
Bus operating expenses:			
Maintenance of plant and equipment	$16,567.44	$20,000.00	$17,373.20
Operating garage expenses	8,765.58	10,000.00	10,357.66
Transportation	18,649.25	20,000.00	19,348.81
Traffic promotion	1,635.84	2,000.00	1,787.49
Administrative and general expenses	6,082.10	7,000.00	7,091.19
Total bus operating expenses	$51,700.21	$59,000.00	$55,958.35
Net revenue—bus operations	21,965.37	20,250.00	20,056.33
Taxes assignable to bus operation	5,996.92	3,800.00	4,482.69
Operating income	15,968.45	16,450.00	15,573.64
Non-operating income	45.75	.....	36.54
Gross income	16,014.20	16,450.00	15,610.18
Deductions from gross income	2,264.32	2,500.00	2,609.83
Net income or deficit	$13,749.88	$13,950.00	$13,000.35

every month what his allowance is for the payroll for his mechanics and for the use of material. This allowance covers expenditures under two accounts: Maintenance of Plant and Equipment, and Operating Garage Expenses. The actual expenditures in the shop are compiled from day to day and each foreman is able to keep in touch, within a day or two, of the actual amount of money he has spent and the amount remaining in his allowance at any time during the month.

Making Use of Service Call Data

It is in the determination of the allowance for the shops that use is made of the statistics on service calls referred to previously. If the trend in the number of service calls per 10,000 miles of operation over a period of time is toward an increase, it is an indication that the allowance for maintenance has not been sufficiently liberal. A tendency towards a decrease, however, might not mean that a reduction should be made in the maintenance allowance. That would depend upon the rate of change in the reduction in service calls compared with the percentage of change in the maintenance expenditure—that is, it would probably be found that as service calls were reduced the expense of reducing them further would increase until the point would be reached where the slight improvement to service would not justify the high cost of obtaining this improvement. In practice a certain number of service calls is inevitable.

The amount of information obtained from the analysis of service call data is not limited to that required for determining the proper expenditure for maintenance. For that purpose alone merely the number of service calls might be sufficient, but with little additional effort other valuable information can be obtained. There are 44 classifications of trouble that are used at the present time, and these statistics aid not only in determining the allowance for maintenance but also enable the maintenance division to direct intelligently its attention and study to the particular things causing the most trouble, and indicates to the operating division how it can cooperate in the prevention of trouble.

Every case necessitating a chauffeur calling on the shop for assistance is listed as a service call. It is interesting to know whether trips were lost or time lost for any particular case of trouble, but the important fact is that trouble occurred on the road. The information desired is that which will show the nature of the trouble and the cause, so as to permit a study of the means of prevention. Lost time or lost trips might be more or less incidental. Every trouble call is potentially an interference with service.

For every call a report is required from the chauffeur and from the mechanic who is sent on it. It is important that these men supply the information required as accurately as possible, and they are therefore given to understand that the object is to collect helpful data rather than to place blame. These reports are examined daily by the superintendent of operation and the superintendent of equipment, who decide the proper classification of the trouble and which of these two divisions should be held responsible. Statistics are compiled monthly showing the number of calls under each classification of trouble for each group of buses, and the number chargeable against each of the two divisions. Information is available as to the number of calls for each bus, the number of calls for each chauffeur and the number of calls for each route, but so far this has been compiled only occasionally for special purposes.

It is considered that every one of the factors mentioned has a direct bearing on practical bus maintenance. Pertaining to the actual work of repairing and operating the buses, reference has been made to garage and shop building facilities, the shop forces, the maintenance division supervisor, the inspection system, lubrication and other shop practices which contribute to continuous service of the equipment. Pertaining to the cost of maintenance reference has been made to the responsibility for fixing this cost, the use of the budget system in controlling the cost, the value of statistics, and the use of service calls as a measure of this cost. Pertaining to the co-operation so necessary to make the maintenance methods effective at a minimum cost, a number of practical means of bringing about such co-operation were referred to: weekly meetings of the supervisory force, circulation of technical magazines, and conferences with chauffeurs and shopmen. These indirect factors of cost study, of control, and of co-operation practically applied, are just as important as the factors which apply directly to the maintenance division.

All Maintenance Efforts Contribute Toward Selling Rides

In every operation there must be a figure for maintenance cost and a figure for total cost beyond which it is impossible to go. It is, of course, most important that the cost be kept as close to this minimum as possible and every means for obtaining this should be used. Concentration of effort on this result must not be permitted to shut out from the minds of the organization the merchandising consciousness. It has been pointed out that in the transportation business, unlike most other kinds of business, the men who manufacture the product are also the salesmen for it. It is not sufficient to operate vehicles efficiently and economically. The business must be sold. There is a limit to cost reduction but there is no limit to selling.

Selling is a matter of knowing what people want to buy and keeping a jump ahead of competitors in supplying these wants. Then, after the customer has been secured, service must be satisfactory in every detail. This business is all a matter of detail and every detail is important. Every single customer must be satisfied every time he makes use of the service. So, therefore, while giving our best thought and study to efficient maintenance cost reduction, let us not forget that our primary responsibility and most important function is to sell our business, and that all of our efforts contribute to that end.

"Buddy" Gets a Permanent Pass

"BUDDY" is the only animal in Nashville, Tenn., allowed to travel without definite limitations on the local electric railway.

He is a German police dog, specially trained to lead the blind, and his quiet unobtrusive behavior has led railway officials to grant his master, twenty-year-old Morris S. Frank, a life pass for the dog on all the cars. Frank, totally blind, went to Switzerland last summer to obtain "Buddy" and to learn his system of guiding a master. Prominent Nashville business men, interested in the dog's work, plan the establishment of a school for training other police dogs for similar service. This institution, known as "The Seeing Eye," is to start operations early next year.—*Syndicated item originating in Nashville.*

Brooklyn City Band Draws the Spotlight

FEATURED on the bills as "Attraction Extraordinary" the 30-piece band of the Brooklyn City Railroad has been appearing during the past few weeks at the Keith-Albee theaters in Brooklyn, presenting a program of popular music. The band, which was organized last August, is composed entirely of trainmen and is under the leadership of William Whitaker, a veteran band leader, but now a regular employee of the railway company. The men present a smart appearance in their neat uniforms patterned after those worn by employees of the train service, and the "act" has been very well received. Arrangements have been made for the band to appear in all the Keith-Albee theaters in Greater New York, and it is quite probable that the booking will be continued to cover the entire circuit, which would take it on the road for more than 60 weeks.

During the first week's appearance in Brooklyn Assistant General Manager A. L. Hodges, of the Brooklyn City Railroad, came out between numbers to deliver a brief address in the interest of community safety, in which he told of the contribution of the street car boys to this movement and made a plea for greater co-operation on the part of the public. He also spoke of the efforts of the trainmen to win the bonus which the company was offering to those whose record was free from "at-fault" accidents, and appealed to members of the audience to give their names to the trainmen when they witnessed an accident, so that its cause might be determined and an effort made to prevent other accidents of a similar nature.

German Three-Car Train Has Unusual Features

ON THE latest type of three-car train used in Dresden, Germany, there are platforms only at the ends of the train, and a corridor extends through all of the three cars. The entrance is in the center of the middle car, and the exits are at the front and rear ends of the train. Each end car has seats for 30 passengers and standing room for six, while the center car is primarily for standing passengers.



A corridor extends from one end of the train to the other



Three-car permanently-coupled train in Dresden

Contest Items May Be Submitted in Any Language

SO MUCH INTEREST has been aroused in the JOURNAL's Maintenance Contest that inquiries have been received from abroad with regard to Rule 12 of the competition. This rule requires all contributions to be written in the English language. The ELECTRIC RAILWAY JOURNAL believes, however, that good maintenance practice is just as commendable, wherever it is originated, and it solicits accounts of good maintenance methods by its foreign subscribers. It has decided that a communication need no longer be in English, provided the other conditions are fulfilled. It welcomes accounts in any language and will arrange for their translation.

Time and Labo



Field coil in position for testing

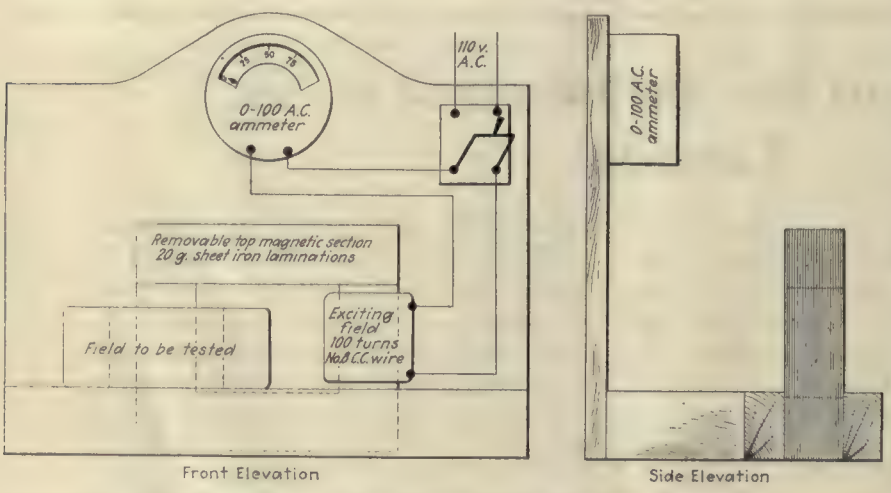
Field Coil Tester a Great Convenience*

By E. M. Lunda
Superintendent of Shops and Equipment Grand Rapids Railroad, Grand Rapids, Mich.

IN THE Hall Street shop of the Grand Rapids Railroad a field coil tester is used which has proved of great assistance in reducing fie'd coil troubles in service. The tester operates on the transformer principle. The magnetic circuit is of 3-in. square cross-section and made of No. 20 gage sheet iron laminations. The primary coil consists of 100 turns of No. 8 cotton-covered wire. It is wound around one leg of the core and the field coil to be tested is placed over the other leg, thus becoming the secondary coil. A removable top yoke completes the magnetic circuit.

Ordinary current at 110 volts is used. When this is turned on the reading of the meter is directly proportional to the condition of the field. With a good field the current will be about 4 amp. or the same value that the primary current would be without a field coil in place, but with the top yoke on. However, when a short-circuited field is on test the current jumps to 50 amp. or more, depending upon the number of shorted turns.

With the tape removed the shorted turns can be found by noting the location of the sparking, or by leaving the applied voltage on until the field becomes heated by the induced current and causes the insulation to smoke.



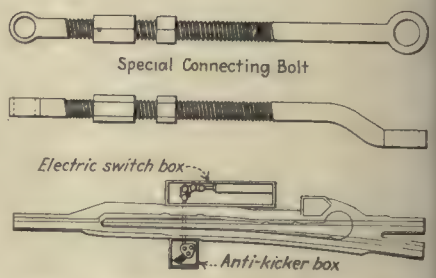
Construction and circuits for field coil tester

Electric Track Switch Safety Device*

By Louis T. Botto
Superintendent Maintenance of Way Department, San Antonio Public Service Company, San Antonio, Tex.

AN ACCIDENT, in which a car of the San Antonio Public Service Company split an electric track switch several years ago, led the maintenance of way department to take special precautions to prevent recurrence of this kind of mishap. On each of the track switches controlled by an electric throwing device, an anti-kicker was placed. This was installed on the opposite side of the switch from the electric box, and the throwing bolt of the electric switch was connected to the throwing bolt of the anti-kicker by a special nut, so that if any part of the electric throwing device becomes broken or out of order, the anti-kicker holds the tongue of the switch in position and thus avoids the danger of the car splitting the switch. The special connecting bolt is made in two parts, one end being 12 in. long and the other 5½ in. long. The two nuts used on the bolt are 1¾ in. and ¾ in. long, respectively.

*Submitted in Electric Railway Journal *Prize Contest.*



Special arrangement of electric track switch to prevent cars splitting the switch

Chuck and Jig for Finishing Axle Bearings*

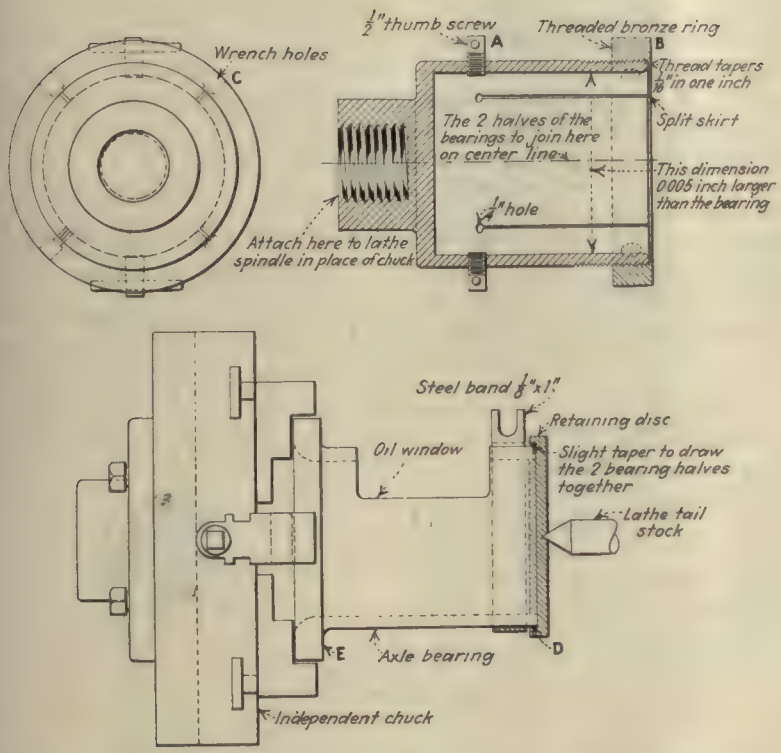
By Charles Herms
General Foreman, San Diego Electric Railway, San Diego, Cal.

IN ITS endeavors to reduce noise in the operation of cars, the San Diego Electric Railway finds that frequent axle bearing renewals are necessary. This maintains proper gear center distances which would be impossible if the bearings are allowed to wear more extensively. To meet the demands for more frequent renewal of axle bearings and still keep maintenance costs from becoming excessive, particular attention has been given to the design of fixtures for the machine work.

The accompanying illustrations show a chuck and a jig for machining axle bearings. The first operation is to face the bearings at the split surface. This is done by holding the face against a 20-in. disk grinder using No. 00 carborundum paper. It requires approximately one minute for a half bearing to be faced and one disk will finish 50 complete bearings.

A top and bottom part of an axle bearing are then clamped together

aving Ideas



Fixtures used by the San Diego Electric Railway for machining axle bearings

and mounted in a chuck. A steel band 1 in. wide is placed around the outside end. This allows part of the bearing at the end to project outside.

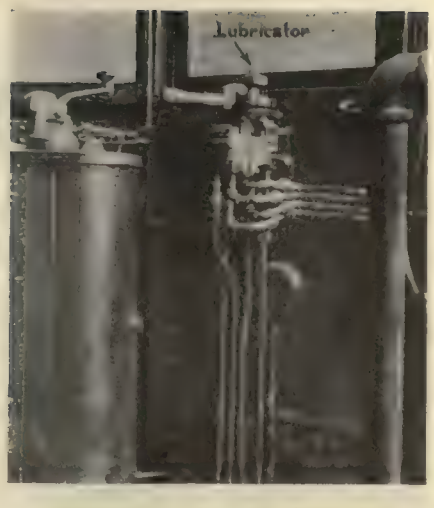
This protruding portion is turned to size as indicated at "D" and then a retaining disk is placed over the end of the bearing and the steel band is removed. The steel band has a thumb screw fastened permanently to one end, while the other is slotted so as to make installation and removal easy. With the steel band removed and the disk in place the remaining portion of the bearing is turned to size.

The inside of the bearing is bored out by placing the two halves in a special chuck. The thumb screws indicated at "A" in the accompanying illustration are tightened and the brass ring at "B" is screwed over the end of the chuck so as to clamp the bearing tightly. This end of the chuck has a tapered thread and is split at four points, so that by turning on the threaded ring the end of the chuck is compressed. After boring out the bearing, grooves for oil are machined and the bearing is then ready for service.

Lubrication of Motormen's Valves

WHEN motormen's valves are not lubricated properly they are difficult to work and abnormal wear and high maintenance costs are bound to result. Again, if an excess of oil is put on the valve stem this excess is deposited on the outside of the valve and often soils the clothing of passengers, with resultant claims for damages.

This condition was considered of such importance on the Richmond Railways, Inc., Staten Island, N. Y., that extensive experiments were made to improve the method of lubrication. It was determined that if the valve stem was drilled and tapped for the reception of a "Dot" lubricating fitting and suitable holes provided for the flow of the grease to the proper surfaces, all of the previous troubles could be prevented. The accompanying illustration shows a motorman's valve with a lubricating fitting attached to the top of the valve stem. This stem is greased on an 800-mile basis. It has been found that the motormen's complaints on hard acting



Motorman's valve with fitting for lubrication

valves has ceased, the maintenance cost has decreased appreciably and the external surface is kept clean.

Fare Box Lights Help Bus Operators*

By C. B. Hall
Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

DUE to the lack of sufficient illumination on fare boxes in buses of the Virginia Electric & Power Company, Norfolk, Va., it was hard to distinguish the denominations of coins and distinguish tokens when dropped by passengers. Interdepartmental conferences brought out a suggestion for installing a lamp to illuminate these boxes. A bracket type housing with a socket for a 3-cp., 12-16-volt lamp was installed. Rays from the lamp are focused on that part of the fare box where money is deposited. Electrical connections are brought from the headlight circuit and provide the same bright and dim effect as is used on general headlight wiring.



Electric light installations on fare boxes of buses operated by the Virginia Electric & Power Company

Improved Equipment Suggestions

Gas Engine Driven Arc Welding Set

GENERAL welding in isolated places not having electric power available may be performed with a new self contained, gas engine driven, arc welding set, recently developed by the Westinghouse Electric & Manufacturing Company. The machine is compact and rugged in design, requiring a minimum amount of floor space and capable of withstanding the most strenuous use. Its over-all dimensions are: length 73 in., width 25 in., and height 46½ in. The approximate net weight is 1,700 lb.

The complete set consists of a model P-20 Continental gas engine,





Welder driven by gas engine

directly connected to a new type Westinghouse 200 amp., arc welding generator, with directly connected exciter overhung from the generator bracket. To provide greater compactness, the generator has a special bracket which fits into the engine housing. Protective covers over the generator, commutator and engine head make the complete equipment weatherproof without the use of a canopy. The engine and generator, complete with all controls, are mounted on an all welded channel iron base. The equipment may be made suitable for either stationary or portable use.

The model P-20 is a four-cylinder Continental engine rated at 24 b.hp. at 1,450 r.p.m., the generator speed. It will operate under a normal load for eight hours on 10 gal. of gasoline. A Zenith carburetor with a friction type choke is operated by a positive centrifugal type governor. The lubricating system is pressure fed by a gear type pump. A centrifugal water pump and liberal radiator capacity provide an efficient cooling system.

The generator is a special type S.K., constant current, differentially compound wound machine. It is rated at 200 amp. for one hour, with a 50 deg. C. rise on a resistance load at 25 volts, in accordance with N.E.M.A. standard practice. The field rheostat, ammeter and voltmeter are all mounted in a control cabinet located on top of the generator frame. The welding range is from 60 to 300 amp.

Thin Wall Threadless Conduit

WITH a wall only one-third the thickness of standard conduits a new electrical metallic tubing is being introduced by the electrical division of Steel & Tubes, Inc., Cleveland, Ohio. This is a thin-wall rigid conduit having all of the characteristics of the standard conduit. It is made from cold-rolled open-hearth steel. It is ductile enough to be bent readily to any desired shape and can be used without threading, connections being made by means of a union compression-type coupling. Part of this coupling may be used as an adapter to connect the conduit to standard threaded or threadless fittings.

Electrical metallic tubing is supplied in 10-ft. lengths, one union-type coupling being supplied free with each length. It is available in ½-in., ¾-in. and 1-in. electrical trade sizes with the same inside diameter as heavy wall conduit. The exterior is electro-galvanized and the inside coated with Bakelite enamel. Ends are protected by metal cap to avoid damage in shipping. The manufacturer claims as advantages that the new tubing eliminates all thread cutting, it is easy to work on the job, easy to handle because of its lighter weight and can be used with any threaded or threadless fittings. It presents maximum protection against corrosion, costs less and carries a standard resale price.

Choice of Fuels Provided with Carbide Light

A NEW kind of carbide light, which will operate with either lump carbide or carbic cakes, is announced by the Alexander Milburn Company, Baltimore, Md. This provides a light or welding generator,



New carbide light which uses either lump carbide or carbic cakes

with extra gas storage space which does not restrict the user to any particular kind of carbide.

The center of the carbide container is a cylinder which holds the carbic cakes and which is equipped with the proper facilities for taking care of the sludge. The outside of this container is filled with conical pockets for the reception of ordinary carbide. This duel fuel principle is incorporated in single lights of 8,000 and 12,000 candlepower and in the duplex light of 16,000 candlepower. This same principle will be incorporated in lights of other capacities on order.

News *of the* Industry

More New York Central Electrification Rumors

In confirming the news that a power survey is under way, the New York Central Railroad on Jan. 2 said no conclusion had been reached on the question of the electrification of the lines of the company across New York State. An official announcement said:

For several years power companies, in conjunction with our own engineers, have been making surveys of our possible future power needs. These surveys are a normal procedure, inasmuch as the railroad has to look ahead many years. While the results of some of these surveys have been laid before the company, no conclusion as to the possible electrification of our lines between Croton-on-the-Hudson and Buffalo, N. Y., has been reached.

Tokens an Acceptable Gift in Richmond

A new method of selling transportation will be put into effect in Richmond, Va., by the Virginia Electric & Power Company. It is the outcome of the successful merchandising before Christmas of gift containers packed with tokens. The small metal cases held a fixed number of tokens in an attractive holiday box. The whole was offered to customers at the cost of the fares, plus 1 cent to cover the container. A total of 7,200 tokens was sold in this way.

After a trial in Richmond, the new plan may be adopted in the other cities served by the company.

Further Moves in P.R.T. Audit

In an ordinance introduced in the City Council of Philadelphia, Pa., on Dec. 27, City Controller Hadley is authorized to engage the auditing firm of Haskins & Sells, New York, to assist in the required examination of the books, accounts and vouchers of the Philadelphia Rapid Transit Company. The measure provides an appropriation of $30,000 for expenses of the audit which the fiscal officer is required to make under the city-P.R.T. partnership agreement of 1907. However, Controller Hadley has since then made public a newly drafted ordinance, authorizing full inquiry in the company's finances, which he intends to offer to Council's Transportation Committee as a substitute for the previous measure.

Mayor Mackey had previously expressed his pleasure at the manner in which the warring elements had been placated and his appreciation of the company's attitude in consenting to withdraw the Supreme Court appeal by which it had endeavored to block temporarily Mr. Hadley's move. He stated that any further recommendations which the controller cared to suggest should be incorporated in the ordinance when it comes up for action. It was his belief that the immediate accomplishment of the audit would expedite early consideration of vital administration projects, such as the new operating agreement for the Broad Street Subway and the contemplated municipal acquisition by the city of the underlying companies included in the system of the Philadelphia Rapid Transit Company.

Co-ordinated Transit for Cleveland

CLEVELAND'S transportation picture begins to unroll as the Van Sweringens, the Cleveland Railway group and local bankers get down to cases. A committee of the Cleveland Railway board will report to the directors within a short time plans for a system, co-ordinating the Van Sweringen interests with those of the railway for the development of rapid transit and surface lines to serve city and suburbs. This report, assuming its general acceptance, will mark the beginning of a new epoch in local transportation. In its general aspects the Van Sweringen program involves very little use of public highways but contemplates the use of private rights-of-way from the suburbs into the heart of the city. With so much money to be invested it would be wasteful folly to build competing systems. They should be co-ordinated on some basis fair alike to taxpayers and investors.

The proposal under discussion by the railway committee has many and obvious difficulties, but its purpose stands analysis. Completion of a co-ordinated system, such as that suggested, would put Cleveland among the foremost cities in the matter of local transportation instead of, as at present, among those worst equipped in this respect.

Service-at-cost as a transportation principle has stood the test of nearly twenty years' experience; we are not ready to abandon it even for the boon of rapid transit. First, to the directorate of the railway, then to the City Council, goes the program now nearing complete formulation. The authors of the plan start with whatever initial advantage there is in the fact that the whole community agrees as to the need of a comprehensive transit program.—*Cleveland Plain Dealer.*

Investigation for Relief in Massachusetts

At the request of Governor Fuller of Massachusetts, a new inquiry has been made into the possibility of some transportation relief between Boston, Chelsea and Revere. A report on the subject has been made to the Governor by Edward E. Whiting, a public trustee of the Boston Elevated. The main point in this report is that instead of the present 20-cent fare, which is 10 cents to the Elevated and 10 cents to the Eastern Massachusetts, there may be arranged a plan for a 15-cent fare which the two roads can divide equally. This would be partial relief, as there is a vast amount of travelling from Revere and Chelsea to Boston and the people have been objecting to the double fare. Mr. Whiting estimates that the reduced fare would mean a financial loss of about $25,000 annually for each company.

For a physical improvement in service the general proposition is that the Elevated should buy the Chelsea division of the Eastern Massachusetts, but on this there is no new evidence. The Governor has asked for a valuation of the Chelsea division, to be made both by the Eastern Massachusetts and by the Boston Elevated, with the suggestion that the public take care of the difference between the two sets of values. Evaluations are in progress, but are not completed.

One temporary proposition is that the Elevated should operate buses from Maverick Square in East Boston through a part of Chelsea to the Broadway section in Revere.

Ruling on Zone Rates in Milwaukee

An extension of the city fare limit on the Howell Avenue-Tippecanoe Line of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has been denied by the Wisconsin Railroad Commission. A petition, filed in August a year ago, requested the commission to investigate the feasibility of extending the single fare zone limit in the town of Lake. A hearing in the case was held in Milwaukee in the spring of last year.

The commission stated that while it was convenient and very frequently desirable in fixing street railway rates to make city limits the limit of the single-fare area, it did not necessarily follow that the two must coincide. Street railway rates must be based upon cost and where it could be shown that the particular line of a city system was unprofitable to an extent to burden the balance of the system, zone rates might

properly be established on such a line to produce additional revenue without regard to the city limits. Considering that the city railway system had been operating without a full return, that the suburban railway system had been operating with practically no return and that the line under consideration was the least profitable of the entire system, the commission did not find that conditions would justify its ordering the extension.

Another City, Louisville, Suffers Traffic Delays

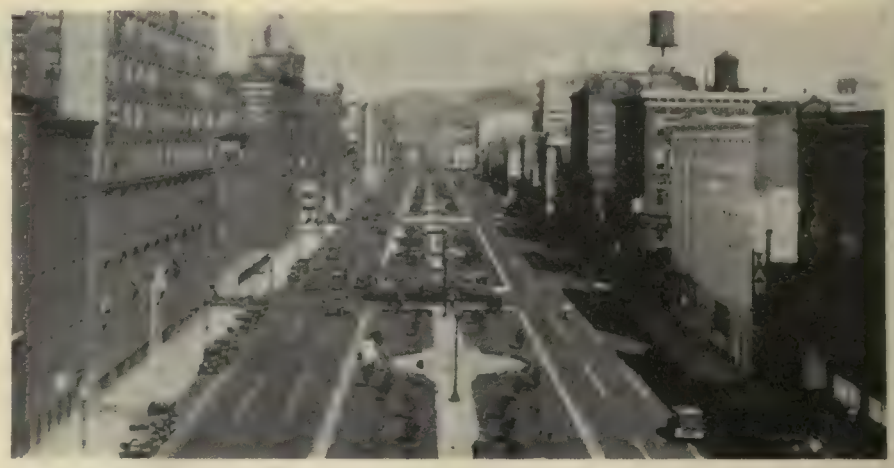
A plea for loading platforms as a means of relief to the cars of the Louisville Railway, Louisville, Ky., due to the new traffic light system recently completed, was made by Samuel Riddle, vice-president of the company, to the Board of Public Works recently.

Mr. Riddle said he had no complaint about the traffic control lights, but showed that congestion is resulting and that cars are delayed ten and twelve minutes over their previous schedules.

The traffic ordinance makes it mandatory for the Board of Public Safety to order the safety loading platforms throughout the central traffic district, wherever the street has sufficient room for their establishment. The ordinance also empowers the board to order motorists to keep to the right of platforms.

Mr. Riddle said that if the plan were to be carried out, automobiles could pass the street cars when the lights are green, remove the congestion of the streets, give greater convenience to passengers and help the railway to maintain schedules. If motorists were forced to keep off street car tracks inside the loading platforms, it would obviate the necessity of stopping the cars once or twice in each block and make for a better condition generally. He urged that steps be taken as soon as possible to bring about the relief aimed at in the traffic committee report and enacted into an ordinance by the Council.

The matter was discussed with the Public Utilities Bureau for its aid. During the discussion, George W. Hubley, engineer of the bureau, pointed out that motorists are again turning right against red signals in the central traffic district, a practice clearly unlawful. Mr. Hubley said taxicabs are reported to be among the worst offenders, although other drivers are also making the unlawful turn.



Magnificent boulevard built over rapid transit right of way

Parades Dedicate Cincinnati New Boulevard

When Cincinnati formally dedicated its new Central Parkway, the magnificent boulevard built for several miles on the top of the Rapid Transit tubes in the bed of the old Miami-Erie Canal, the occasion was marked by a celebration lasting three days, with a big parade each day from one end of the Parkway to the other. The first parade embodied all the functions of city government, among other things depicting the development of transportation. The second parade was composed of floats showing the early history of Cincinnati, and the third parade was composed of the city's fraternal organizations.

When the Cincinnati Street Railway was called upon to take part in the first parade and asked to help show the development of transportation, something of a problem was presented. None of the early horse cars used in Cincinnati have been preserved that might serve for exhibition purposes and there are no street car tracks on the new Parkway. The company therefore decided to show the development in motor coach transportation and at the same time call public notice to the fact that street car service still furnishes the backbone of urban transportation, and then demonstate it is also going right ahead in the development of better street cars. Accordingly the street railway float consisted of an ancient bus, an Armleder, built in 1916, which was followed in the parade by a modern Twin Coach. The old Armleder attempted to seat 20 passengers on longitudinal wood seats. It was equipped with solid tires. The Twin Coach carried the street car story with three posters in the windows on each side, which read as follows:

WATCH FOR THEM

We cannot run our beautiful new street cars on the Parkway, but you will soon see them on the streets.

PUBLIC SERVICE

Our Street Cars Carried
125,000,000
Passengers
Last Year.

PROGRESS

New Car Repair Shops.
56 Miles New Tracks.
19 New Power Stations.
100 New Street Cars.

Accidents Decline in Buffalo

An important contribution to public safety was made in November by the International Railway, Buffalo, N. Y., when Bernard J. Yungbluth, president of the company, announced the total number of accidents was 19.4 per cent less than during the corresponding month of 1927 and lower than any November in the last 12 years. Collisions between street cars and automobiles, which outnumbered all other types of accidents, were 24 per cent less in November despite the increased automobile registration. Derailments were reduced 23 per cent while the number of accidents due to car equipment was the same as in November, 1927.



Development of bus shown in parade on Cincinnati parkway

Service Changes Made in Seattle

Drastic curtailments and service changes were put into effect on Dec. 3 on the Seattle Municipal Railway, Seattle, Wash. The program means new transportation service for the south end industrial district, but complete abandonment and rerouting of car and bus service for other areas. It contemplates:

1. Discontinuance of the Ray Street shuttle service on Queen Anne Hill.
2. Abandonment of service on the Youngstown shuttle line.
3. Stopping of service on the Lake Burien line outside the south city limits.
4. Cutting out of the Green Lake Bus Service.
5. Complete rerouting of the Seward Park buses.
6. Making Beacon Avenue and Spokane Street the terminus of the Beacon Hill bus route.
7. Inauguration of early morning and evening "tripper" car service between First Avenue and Pine Street and the Boeing Airplane plant.

Advance arrangements had been made, Mr. Avery announces, for the tripper cars to carry 165 employees of the Boeing factory to and from work night and morning.

Mr. Avery declares that the Ray street shuttle, two blocks long, is losing $308.16 a month; the Youngstown line, only six blocks from the Spokane Street car line, is losing $285.60 a month; the Lake Burien line has not paid for many months; the Green Lake Bus route, which is a duplication of the Green Lake railway service, is losing $1,650 monthly. By discontinuing the lines the system will save about $2,000 a month.

Fare Discussion in the Twin Cities

The City Council of St. Paul, Minn., is reported to be ready to sign an agreement with the St. Paul City Railway providing for a fare increase which would provide a 7½-cent fare token and a 10-cent cash fare if the Minnesota Railroad and Warehouse Commission will consent to the same rate of fare for St. Paul as Minneapolis. The Minneapolis City Council presented its case to the Minnesota Railroad and Warehouse Commission a week ago. The 7½-cent token fare to replace the present 6⅔-cent fare was considered a likely basis of settlement of the fare question.

Mayor George Leach of Minneapolis will oppose the plan which will give St. Paul the same fare as Minneapolis. The two cities adjoin and the interurban lines of the two companies pass from one city to another.

St. Paul is opposed to a rate of fare higher than that of Minneapolis, while Minneapolis contends that it is entitled to a lower fare because the earnings on valuation of property in Minneapolis have been larger than in St. Paul.

It is generally expected that the solution of the fare problem will be left to the 1929 Minnesota Legislature. A movement is under way to have the properties of the Minneapolis and the St. Paul companies of the Twin City Rapid Transit considered as one system for rate-making purposes and that is expected to be before the Legislature.

The latest report for a month shows that the St. Paul property in November was operated at a deficit of $15,000.

Keeping The Riding Public On Allentown Trolleys

With a keen originality, the Lehigh Valley Transit Company, Allentown, Pa., is keeping the desirability of transportation by trolley before the public through the medium of clever newspaper advertising. It may well be called "good will" advertising, for it points out the advantages which owners of other transportation mediums miss. It develops, too, a strong impression in favor of the railway's superior convenience. It may also be called "civic service" advertising. As many autoists as the Transit Company can win over to the railway, correspondingly fewer autos will be parked on the city streets. The labors of traffic police, the annoyances of traffic jams and the damage to autos are all materially decreased.



Effective appeal for riders at Allentown

Illustrations made up for the particular object of the advertisement strike a note that catches every reader. "There are no radiators to freeze on trolley cars!" is a statement that makes a man think. No one can delude himself into the belief that an auto is warmer, or more comfortable, or more adaptable in winter weather. Parked automobiles on snow-covered streets are always in danger of being struck by another skidding vehicle. Inability to get away, or to reach objectives in time to return for the car to avoid overstaying the parking time limit, may mean a red tag and a hearing. A frozen radiator means heavy expense. These points are brought out in a practical way through this advertising copy.

Traffic Engineer at Work in Detroit

Harold M. Gould, former traffic engineer of Dodge Brothers, who conducted the $30,000 police traffic survey, has been employed by the Department of Street Railways, Detroit, Mich., in the capacity of consulting traffic engineer. He was appointed by Commissioner William P. Rutledge, after the City Council had adopted a resolution creating the position.

Councilman Bradley's proposal said the post was particularly necessary now in view of transportation conditions. Moreover, the suggestion was in line with a communication presented later by Daniel T. Crowley, the new third deputy police commissioner. Mr. Crowley was present and was introduced to the councilmen by Mr. Rutledge.

Late in 1926, when a traffic survey was made by the city, Mr. Gould aided Arthur T. Waterfall, then director of public service, in the work, for which the City Council had appropriated $30,000. Mr. Gould has assumed his new duties.

On motion of Councilman Arthur E. Dingeman, the councilmen agreed during a general traffic discussion to restore the ban on outbound parking on Grand River Avenue between 4:30 and 6:30 p.m. As an experiment, the Council at the request of the merchants lifted the police order several months ago. Since then police officials have declared the privilege was abused and that some merchants were accustomed to park their own cars in front of their business places for nine hours at a time.

Subway Favored in St. Louis When All Are Benefited

The St. Louis Public Service Company favors the establishment of a subway in St. Louis, Mo., provided that it will serve all sections of the city, running fanwise out of the business district. Stanley Clarke, executive vice-president of the company, made the statement before the Optimists Club recently. Mr. Clarke is a non-voting member of the St. Louis Transportation Survey Commission. It was a fact, he claimed, that any progressive railway would favor a subway. Mr. Clarke also explained some of the problems that beset a railway and recited some of the accomplishments of the St. Louis Public Service Company during the year it has had charge of the St. Louis system.

Recommendations Made by Massachusetts Governor

In his inaugural address to the Massachusetts Legislature, Governor Frank G. Allen recommended continuance of private ownership and public control of the Boston Elevated Railway, liberal extension of rapid transit in Metropolitan Boston, and the early construction of another East Boston tunnel.

No-Parking Trial Approved in Springfield

The Chamber of Commerce of Springfield, Mass., went on record on Dec. 12, by vote of its board of directors, as being unopposed to the proposed 90-day trial of a parking ban on Main Street between the hours of 4.30 and 6.30. It was voted at the same time to authorize Major Frederick J. Hillman, executive vice-president of the Chamber, to appear before the rules of the road committee of the city government and make known this change of attitude.

One of the strongest reasons why the Chamber previously opposed such a move was that the restriction of traffic in the busiest section of the town might harm trade in the stores in the affected region.

Will Experiment With Skip-Stop in Indianapolis

Development of a selective stop plan for speeding up the service on the East Washington Street line of the Indianapolis Street Railway, one of the busiest lines in Indianapolis, has been put up to the company by the Indiana Public Service Commission. Under the terms of the order, drafted by Howell Ellis, commissioner, officials of the company will have a reasonable time in which to work out a skip-stop plan and to submit it to the commission. If, in the judgment of the commission, the plan is feasible, it will be tried for 30 days and will be adopted permanently if successful.

Members of the commission estimated that the skip-stop plan will save approximately 10 minutes on a trip from the city limits to the business district. The commissioners will suggest verbally to the car company that alternate stops be designated along the line and that crosstown service be discontinued.

The matter of a selective stop plan went before the commission when a petition was filed by several patrons of the line, suggesting that cars bearing placards of certain colors be required to stop only at designated streets. A hearing on the plan was held. Officials of the company, asserted that the color plan would confuse both crews and patrons. In the order, this suggestion was overruled by the commission.

Parked Autos Scored in Montreal

Officials of the Montreal Tramways, Montreal, Que., recently declared that not until automobile parking on certain sections of the busier street car thoroughfares was prohibited directly after snow storms would tramway service be improved. During a recent storm the company did all it could in getting the tracks cleared, but this clearance made the motorists prefer the streets on which the street cars were run to the other thoroughfares. This influx of traffic to the street car lanes would not interfere seriously with the movement of traffic, if the automobiles were not lining the curb. Officials remarked that parking might be prohibited on certain streets throughout the entire winter months. If this were done, the flow of traffic through the busier sections of the city would be able to continue uninterrupted, and an improvement in service would ensue.

More Tips on North Shore Wanted

With the dawning of the new year, the slogan of the North Shore Line is a banner business year. To that end, a concerted drive for new business in all branches of the service was undertaken on Jan. 1. Roy Thompson, traffic manager of the Chicago, North Shore & Milwaukee, in outlining the aims of the drive, said that new business of all kinds was desired; that the company was not going to concentrate on any special phase of service. Under the plan, better business credits will be allowed for all revenue producing tips solicited by employees. Every successful effort toward building up patronage for the North Shore Line will be recognized.

A new feature of better-business activities is the introduction of a plan by which credits would be awarded to employees whose outstanding work to promote good-will and better public relations between the company and its customers is worthy of recognition. Any member of the North Shore Line family who performs some act of personal service which makes more satisfied customers will, on recommendations of the better business department, be given credit according to the value of the deed.

Six "Road of Service" boosters were awarded merit badges by the better-business department during the period from Oct. 15 to Dec. 1, 1928, and 81 revenue-producing passenger tips were turned in by employees participating in the better-business drive during that period. For these tips, a total of 363 credits were awarded by the better-business department.

$45,000 for Safe Operation in New Jersey

More than $45,000 was paid out in December, 1928, to operators of the Public Service Co-ordinated Transport, Newark, N. J., for operating without accident for the four-month bonus period ended Nov. 30. Under the company's "no-accident" bonus plan special inducements have been made to encourage operators to take every precaution possible to insure the safety of their passengers. The successful co-operation of the operators is indicated by the large number sharing in the awards. In the Passaic Division 371 operators received $7,342 in bonuses.

Toronto Opens Its Lake Shore Route

With the opening of the new double-tracks along the Toronto-Hamilton Highway as far as Long Branch, another route sign "Lake Shore" made its appearance on cars of the Toronto Transportation Commission, Toronto, Ont. Every second Lake Shore car runs the whole distance from Queen and Victoria to Long Branch, supplying an eight-minute service during normal hours and a more frequent service in rush hours. The rest of the cars on the route will be designated "Lake Shore Humber" or "Lake Shore Sunnyside." The fare to the city limits is one regular ticket or 7 cents, and a second city fare is collected between the city limit and Long Branch. Beyond Long Branch there is the "Port Credit" route supplying 15-minute service, with additional cars in rush hours, for a 5-cent fare. A half-hour service is supplied on the "Mimico" bus route, operating from the Humber west on Queen Street and then south on Church Street, Mimico, to the Lake Shore Highway. A regular city fare is collected on this route and free transfers are issued to enable passengers traveling west of the city limits to change from the buses to the Lake Shore route cars.

New Regulation for Utilities Urged by Economist

A different type of regulation for public utilities was urged by Professor C. O. Ruggles of Harvard University, an expert in public utility matters, at a meeting of the American Economic Association held in Chicago on Dec. 28. This regulation would call for the establishment of a number of federal regional commissions, which would control the activities of public utilities within the twilight zones between state and federal jurisdictions. Professor Ruggles declares that such regional commissions would probably stimulate the states to improve the efficiency of their commissions. If brains are needed and needed in greatly increased numbers within the industry itself, to him it appeared that an increase both in the number and in the quality of the commissions would also be a normal development.

A scientific study of the problem was emphatically urged by Professor Ruggles in a constructive suggestion which in part follows:

Whatever federal agencies are proposed for the control of utilities other than railroads deserve to be given some such study as was given to banking by the National Monetary Commission previous to the adoption of the Federal Reserve Banking Law. Regulation, both by the states and by the federal government, should give some promise of encouraging initiative in management, and indeed should give management a fairly free rein, but both operating companies and parent organizations should be held responsible for results and allowed a rate of return in accordance with the contributions which they make toward efficiency in management and toward the maintenance of satisfactory service.

Committee on Insurance Meets with Underwriters Group

With a number of representatives of the Central Traction & Lighting Bureau attending as guests, the committee on insurance held its organization meeting in New York City on Dec. 13, 1928. It developed that the underwriters committee and the committee from the association were on common ground at many points, and that the results of fire prevention work, which have been sponsored and encouraged by both groups, are beginning to be reflected in the experience reports which have recently been collected by both bodies.

The committee concerned itself particularly with hazards which have arisen through the introduction of spray-painting and the use of lacquers, the nature of which is not yet thoroughly appreciated, and the view was expressed that, if the smaller companies would more generally avail themselves of the practices of certain larger properties in the matter of precautionary measures, the loss experience of the industry would be materially reduced. Bus operation has also introduced certain hazards that require special attention.

An effort is to be made to bring about a wider and more representative response to the committee's questionnaires, which are soon to be distributed, to the end that a more complete and comprehensive cross-section of the industry's loss experience may be obtained. The insurance group is collecting similar data and it is desired to have accord as complete as possible, between the two reports. The fact that some companies do not reply to association questionnaires on insurance data leads the committee to believe that these same companies, upon receipt of suggestions from the underwriters, fail to give them the attention they merit, with the result that the experience table of the entire industry is made to suffer.

Among those who attended the meeting were, H. B. Potter, chairman; B. L. Tomes, vice-chairman; Frank L. Butler, Ralph S. Child, N. H. Daniels, F. M. Hamilton, A. D. Knox, John H. Moran, Paul E. Wilson, L. S. Storrs, Guy C. Hecker and James W. Welsh.

The Real Spirit in Cleveland

That intangible thing — Christmas Spirit—took on practical form recently when the entire male chorus of the Cleveland Railway, accompanied by J. H. Cox, the company's director of welfare, journeyed to Sandusky, Ohio, for the purpose of staging a concert for the old and the sick in the State Soldiers' and Sailors' Home. There followed an hour and a half concert in the chapel. The singers went from ward to ward, rendering Christmas carols. They were even allowed in the incurable ward—the first time it's been done, so it is said.

This male chorus of the Cleveland Railway is now two years old. The director is Charles D. Dawes, who has made famous the Orpheus Male Choir. In addition to this activity the chorus traveled to Warrensville to spread more Christmas spirit and later sang at the railway men's big Christmas party held in the public auditorium and sponsored by the Cleveland Railway.

Christmas Awards in Nashville

Motormen and operators of the Nashville Railway & Light Company, Nashville, Tenn., numbering 104, participated in the $1,000 yearly prize offered by the company for safe operation of cars. In 1927, 79 men received the awards. The period is from Dec. 1 through Nov. 30, being thus arranged as a Christmas bonus. Motormen and operators who finished the year in this first class received $9.60 as their part of the yearly prize and $13.10 under the four months bonus, making a Christmas gift of $22.70. These men operated approximately 30,000 miles each during the year.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 14-18*—American Road Builders' Association, convention and road show, Cleveland, Ohio.**

***Jan. 15-16*—Kentucky Association of Public Utilities, annual meeting, Brown Hotel, Louisville, Ky.**

***Jan. 22*—New York Electric Railway Association, mid-winter meeting and dinner, Hotel Commodore, New York, N. Y.**

***Jan. 23-25*—Electric Railway Association of Equipment Men, Southern Properties, and Southwestern Public Service Association, Mechanical Division, joint meeting, Houston, Tex.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, New Public Auditorium, Atlantic City, N. J.**

Purchases and Stores Committee Meets

Planning its work for this year was the main accomplishment at the meeting of the Purchases and Stores Committee of the American Electric Railway Engineering Association held on Dec. 17 at the association headquarters, New York City.

Activities of the four old special committees and the three new special committees were discussed. The subjects of the old committees consist of:

1. Manual review.
2. Standard packages.
3. Investment in material and supplies and the cost of operating stores.
4. Methods and practices for keeping price records and pricing materials and supplies received and issued.

In view of the resignation of C. A. Harris, chairman of Committee No. 3, Walter S. Stackpole, was elected chairman of this special committee.

The three new committees are:

Special committee No. 5, to recommend a method of standardization and of stock; special committee No. 6, to study control of material and supplies, including control of so-called "floating" and line stocks; and special committee No. 7, to study the reclamation of used materials and the sale of scrap and salvage. The chairmen of these new committees are: No. 5, R. A. Wuster, of the Chicago Surface Lines; No. 6, Edward F. Kelley, of the Louisville Railway; No. 7, W. A. Staub, of the United Railway & Electric Company of Baltimore.

To make this year's convention program as comprehensive as possible, a convention committee was appointed, consisting of the chairmen of the special committees, headed by the chairman of the standing committee.

Super Service in Little Rock

Again during the Christmas season the Arkansas Power & Light Company, Little Rock, Ark., had the service men on duty to assist the patrons with their bundles, to make change, and to find their cars in the rush hours. As pictured by the daily papers, it was a handsome and courteous crew of men.

Kansas City-St. Louis Project Before Washington Lobby

Prospects appear brighter for the building of the Kansas City-St. Louis Electric Railway, denied the right to build by a decision of the Public Service Commission of Missouri. It is said that Senator James Reed suggested the road be built across state lines, thus making the project a federal, instead of a local affair. This seems to be the procedure at present. The company has set up an office in Kansas City, Kan., and Albert Ross, attorney of Kansas City, is in

Washington, D. C., seeking approval of the project.

Although the company secured a right-of-way across the state of Missouri, the Missouri Commission at Jefferson City held that no need existed for another railroad and especially no need for an electric one. More recently some of the land has been resurveyed through St. Charles County with the object of crossing into St. Louis County at a point nearer St. Charles than Weldon Spring, the site originally selected for a bridge. The question that remains is what will be done about this project at Washington.

Would Pay Losses on Equipment in Ten Years

The Massachusetts Public Utilities Commission has heard petitions of the Worcester Consolidated Street Railway, and the Springfield Street Railway of Worcester and Springfield, Mass., to extend over a period of ten years' payment of losses resulting from dismantling wiring and other equipment effected on certain motorized lines.

Attorney Bentley W. Warren, representing both traction companies, stated that the Worcester Consolidated had suffered a loss of $985,915, of which it proposed to assess stockholders premiums of $227,296, and cover the remainder by payments over a ten-year period. The Springfield company's losses were even larger, he said, amounting to $1,074,803. Of this amount $269,174 would be covered by premiums paid on capital stock, and the balance of $805,629 the company desired to pay over a ten-year period beginning this year.

Cascade Tunnel Service to Start Jan. 12

Service through the Cascade Tunnel near Seattle, Wash., by the Great Northern Railway scheduled to start on Jan. 12 will complete a $30,000,000 improvement program including 73 route-miles of electrification. Of this, the tunnel project amounted to more than $14,000,000, while the electrification of the 73 route-miles cost $6,000,000, new equipment cost $5,000,000, and the construction of the Chumstick cut-off cost $5,000,000.

The celebration in the opening of the tunnel will be participated in by representatives of Congress, railroad officials from the United States and elsewhere, officials of firms who were interested in the building of the tunnel and many others.

One feature of the program will be to send the first official train carrying the special inspection party through the new tunnel. The ceremonies at Scenic, at the mouth of the tunnel, presided over by Operating Vice-President C. O. Jenks, and those at New York City, presided over by President Ralph Budd will be broadcast over the national hook-up of the National Broadcasting Company.

Foreign News

Cape Electric Makes Report

The profit and loss account of the Cape Electric Tramways, Ltd., operating in Port Elizabeth and Cape Town, South Africa, for the year ending June 30, 1928, shows a profit of £38,347, and after providing for debenture interest, redemption of debentures and taking into account the balance brought forward from last year, a balance remains of £38,625. From this amount the reserve fund has been credited with the sum of £10,000, leaving a balance of £28,625. During the year under review, the tramways carried 30,803,751 passengers with gross receipts of £315,431 against 32,532,080 passengers with gross receipts of £388,378 for the year 1926-1927. Buses in Cape Town also carried during this period 10,689,580 passengers with gross receipts of £122,639 against 3,169,585 passengers with gross receipts of £43,008.

In spite of the fact that the combined tramways and bus services show an increase over the preceding year of 5,791,666 passengers and in receipts of £6,683, the reduction in fares together with the increase in the expenditure to meet bus competition have made serious inroads into the profits. At the same time wages remain at the high level which obtained when satisfactory profits were being made.

The capital expenditure amounts to £33,583 and represents the cost of buses, rolling stock, and additions to the permanent way in Cape Town and Port Elizabeth. This sum was provided out of the funds of the company.

Doctors Run Street Cars

FIVE hundred physicians and lawyers without clients have been given jobs as street car conductors in Budapest. They came mostly from former Hungarian territory, which is now attached to Rumania, Yugloslavia or Czechoslovakia. The regular conductors, whose places were taken by the professional men, have been transferred to farms which the government granted to them on a system of installment payment.

The wholesale exodus of doctors and lawyers from former Hungarian provinces gave this country far too many of those classes of professional men. They were unable to find work in competition with the 100,000 other unemployed of the country and had been living on government doles.

Count Stephen Bethlen, Prime Minister, remarks that Hungary is too small and too poor to feed all her former subjects who, because of patriotism, had refused to become citizens of the governments which have taken over former Hungarian provinces. In an attempt to alleviate the condition in the professions, the government has sharply restricted the number of students who are now being admitted to the medical and law schools of the university.—*Dispatch from Budapest to New York Times.*

Electrification Plan in Mexico Reported

Electrification of that part of the National Railways of Mexico between Monterey and Tampico is being considered as a part of a project now being promoted by the governments of the states of Nuevo Leon and Tamaulipas in conjunction with the federal government.

The plans under consideration involve the construction of a large dam and water storage reservoir at El Mezquital, state of Nuevo Leon, and the installation of a hydro-electric plant. The power from this proposed plant would be transmitted to Monterey, Victoria, Montemorelos and other cities and towns, and also a sufficient supply generated to operate the railroad between Monterey and Tampico.

It is stated that, when the surveys are completed, American capital may be invited to take over the project. The water supply afforded by the storage reservoir also would be used to irrigate a large area of land now in a wild state.

Australian Tramway Shows Profit

Financial report of the New South Wales Tramways for the year ended June 30, 1928, showed earnings of £4,556,561 and operating expenses amounting to £3,938,356, leaving a balance of £619,205. After paying interest charges amounting to £591,937, there was a profit of £27,808. During the previous fiscal year a loss of £269,916 was sustained. Although there were substantial increases in expenses, due to court awards, shorter hours, family endowment and a 44-hour week during this period, these were more than offset by the increase in revenue and by progressive improvements in operation.

Garage Development in Lancashire

A new garage, complete with workshops and washing plant and capable of accommodating 100 vehicles, was opened on Oct. 11 by the Lancashire United Transport & Power Company at its headquarters in Atherton, England. Three vehicles can be swept, dusted, fueled and washed every six

minutes. The repairing and overhaul shops are also complete.

At other garages of the company about 120 buses can be handled. At present 150 buses, operating over 200 miles of route, are owned by the company.

This tramway is giving a great deal of attention to the development of its bus business and large extensions are now under contemplation.

Trackless Trolley Substitution in England

Installation of a trackless trolley system on an additional route, instead of relaying the worn-out tramway track, has been decided upon by the City Council of Bradford, England.

The report of the chairman of the tramways committee said that the comparative operating costs per annum of the three available systems were: Tramcars, £35,765; trackless trolleys, £30,051; buses, £30.936. He also said that trackless trolley vehicles could be run with cheaper fares, greater comfort and greater safety. If buses were used, the electricity department of the city would lose about £24,000 per annum, while the cost of relaying the tramway track would be about £148,000. Installation of the trackless trolley system would cost about £43,000, he reported, and the cost of installing buses would be about £35,000, but the buses would only stand about two years' service.

BUS CONTROVERSY IN ARGENTINA—Suit for 10,000,000 pesos has just been brought against the city of Buenos Aires by the Argentine Tramway, on the ground that buses and jitneys are violating their concession.

BUS SUBSTITUTION IN GERMANY—The City Council of Wiesbaden has decided to abandon the use of street cars and replace them with buses, with seating and standing room for 56 passengers.

SPANISH RAILWAY ELECTRIFICATION—Electric trains are now operating on the Barcelona-Manresa section of the Northern Railway of Spain and it is expected that electric trains will be operating over the Algorta-Plencia line by the end of 1928.

Electric Railway Extension in Italy

The Societa Anonima Ferrovie Elettriche Biellese, a private company which runs an electric railroad from Biella to Corsato and Vallemosso, has decided to build a branch line from Corsato to Masserano and later extend into other towns. This extension is guaranteed to be working fully by the end of 1929 and construction has already begun. The extensive population and agricultural importance of these sections have necessitated the new line.

Recent Bus Developments

Midwest Coach Deal Consummated

Operations of the Midwest Motor Coach Company, which renders motor coach service between Gary, Ind., and 63rd Street, Chicago, was formally taken over on Dec. 28 by a new corporation, the Midwest Motor Coach Company of Indiana, of which Charles W. Chase is president. Official approval of the purchase of the business and assets of the Midwest company, an Illinois corporation, was given on Dec. 24 by the Public Service Commission of Indiana, concluding negotiations which have been in progress for several months and which were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 22, 1928.

According to Mr. Chase, who also is president of the Shore Line Motor Coach Company of Gary, the new company will not be merged with the Shore Line, but will be operated as a separate unit. Co-ordinated schedules, established by the two lines on Jan. 2, now provide regular 15-minute service between Gary and Chicago. Alternate departures of Midwest and Shore Line coaches have been arranged from both terminals, replacing the previous 20-minute headway and identical leaving times of both bus lines.

For the Protection of Connecticut's Children

SCHOOL authorities throughout Connecticut are warning both parents and children of the dangers involved in the prevalent custom of school children who, on the way to and from school, beg rides from passing motorists. In addition to the fact that they usually get rides from strange motorists, and may ride with some who are reckless drivers or whose vehicles are not in safe condition, it is thought by school officials to be especially dangerous for several children to be placed in an open motor vehicle of any kind without a guardian, for the reason that the children, released from school discipline, more often than not will play with and jostle each other, with the possibility of disastrous consequences. The motorist is not liable for any accident that may occur to the children while in his car, unless it can be proved that he caused it intentionally or through reckless operation of his vehicle.

In discussing this problem, Vice-President W. J. Flickinger of the Connecticut Company said that the street railway company was given the responsibility of transporting many hundreds of school children to and from the schools each day. The employees of the company made every effort so to discharge this responsibility as to afford these children the maximum of safety, and the parents whose children rode the street car have no cause for worry.

Ohio Independent's Operations Curtailed

Protested by three transportation companies, the petition of the Warren-Salem Coach line for removal of operation restrictions has been dismissed by the Ohio Public Utilities Commission at Columbus. Shortly after the Youngstown & Suburban and the Stark Electric Railroad began a joint service of street car and bus between Canton and Youngstown, the Warren-Salem company asked permission to join with the Youngstown-Akron line, operated by the Penn-Ohio system, in giving through bus service between Youngstown and Alliance. In the original certificate issued the Warren-Salem company, this was prohibited.

When the hearing was held on the matter, the petition was protested by the Stark Electric Railroad and the Youngstown & Suburban, which at present are giving hourly service connecting Canton, Alliance and Youngstown, and by the Pennsylvania Railroad which operates a one-track branch line between Youngstown and Alliance. At the close of the hearing, Attorney C. M. Shelter, representing the Stark Electric Railroad, made a motion that the petition be dismissed on grounds that the Warren-Salem line failed to prove any necessity for the new service. He was joined in this motion by attorneys for the other two companies. Two days later the commission sustained the motion and dismissed the petition.

Applications of two other companies for permission to operate bus lines in the Canton, Alliance and Youngstown district are still pending before the state board, both of them being protested by the Stark Electric and the Youngstown & Suburban.

Would Supplant Railway Service in Santa Barbara County

Application has been made by the Pacific Coast Railway to the California Railroad Commission for authority to discontinue service on a portion of its track at Guadalupe Station, Santa Barbara County, and for a certificate of public convenience and necessity to operate auto stage service for the transportation of passengers and their baggage between Guadalupe and Santa Maria in place of electric railway service, between those towns.

Traffic Suggestions Made for Kansas City

Recommendations for interurban bus traffic regulation have been made to the City Council of Kansas City, Mo., by the traffic committee of the Kansas City Safety Council. They are designed to eliminate much of the congestion due to the loading and unloading of interurban and suburban buses in the downtown section of the city. The recommendations are as follows:

1. After Jan. 1, no street loading of interurban or suburban buses will be permitted in the congested district. This district will be known as that which is north of 19th Street, south of 7th Street, west of Locust Street, and east of Central Street.

2. Only one discharge of passengers will be permitted in the congested district and that will be made off-street.

3. Pick-up of passengers will be permitted only off-street in the congested district and when more than one stop is made for this purpose, it shall be made on the route specified by the routing committee and in no case will it cause the bus to double back through the congested district.

4. The route traveled by the buses within the city limits shall be approved by the Police Commissioners, the Director of Public Works and the Park Board.

5. All ordinances establishing bus loading zones for interurban and suburban buses shall be cancelled and none other shall be established.

In addition to these recommendations the following memorandum was submitted to the Council:

In the interest of the safety of passengers, the Safety Council recommends that the City Council pass such ordinances that it will permit the operation and the sale of tickets in Kansas City only by such lines as are authorized to do business in Missouri by the state commission. This will assure the public that the company is properly regulated and insured. It will also assure the city that it is receiving its proper share of the license fee.

Tax Judgment in Connecticut Stands

A judgment that the Connecticut Company, Hartford, Conn., pay bus taxes under the personal property tax act to the amount of $2,011 on 26 buses assessed at $95,800 as of July 1, 1926, was allowed by Judge Brown in a recent court session. The tax was opposed by the Connecticut Company, which was joined by the state on the theory that the equalization tax of 3 per cent paid the state on property was in lieu of all existing taxes.

The state of Connecticut and the railway sought an injunction to restrain collection of the fixed tax of $2,011 and Judge Brown enjoined the city from collecting or attempting to collect any further payments upon or under said assessments. Since that date a change in the state laws provides that the state take over this phase of taxation. The Connecticut Company will pay the city of Hartford this tax and the state of Connecticut has agreed to credit the company through the equalization tax.

Agitation Over Elkhart Accident

As a result of a recent bus accident in Elkhart, Ind., a movement is underway in the state to enlist the aid of the Indiana delegation in Congress to put through a bill to limit the hours a bus driver may be permitted to work. The bill in its general purpose would be along the same lines as the present 16-hour law applicable to trainmen in railroad service. The accident, climaxing a series of less serious ones, claimed the life of one man and resulted in the serious injury of thirteen others.

The county prosecutor declared that the crash primarily was due to negligence in permitting extra drivers to work for long periods of time with inadequate rest. It developed in the investigation that Julian Spooner, driver of the bus, and his relief driver, both employed by the Pony Express Lines, had been on duty nearly 48 hours, each having slept in buses while the other was driving. Both drivers had to be sent to the hospital in Elkhart and Spooner is at liberty on a $2,000 bond pending outcome of the investigation.

It also was declared by the investigators that the bus was speeding and failed to heed a traffic stop sign.

Stock Issue in Los Angeles for Equipment Acquisition

Authority has been granted to the Pacific Electric Motor Transport Company by the Railroad Commission to issue and sell at par, on or before June 30, 1929, 1,000 shares of its common capital stock of aggregate par value of $100,000, for the purpose of acquiring motor trucks and other equipment. The Pacific Electric Railway, Los Angeles, Cal., has been authorized to acquire and hold said stock.

Bus Succeeds Trolley on Line in Rome, N. Y.

The Public Service Commission granted the petition of the New York State Railways on Dec. 31 to discontinue operations for the year along Madison Street in Rome and the petition of the Utica Railway Co-ordinated Bus Line, Inc., for a certificate to operate a bus line on a 30-minute schedule, the fare rate to be the same as charged on the trolley line. The bus line will serve the same territory as at present served by the trolley line which will be temporarily discontinued. City authorities of Rome favored the grant of the two petitions. No opposition to the changes proposed was expressed at the hearings before Commissioner Lunn.

Franchises Sought in Sacramento

Application for franchises on a number of newly selected bus routes was filed by the Pacific Gas & Electric Company, Sacramento, Cal., with the City Council on Dec. 13. Ten years would be the life of the franchises, based on the authority of the Council to withdraw present railway service on G and H Streets. The new lines would not become operative until the railway line is abandoned.

Sunset Boulevard Extension Denied

After further hearing the California Railroad Commission has denied the petition for rehearing filed by the Los Angeles Railway Corporation and the Pacific Electric Railway, operating under the name of the Los Angeles Motor Coach Company, on its application for a certificate to extend its Sunset Boulevard motor coach line. The commission, however, amended its previous order to eliminate transfer privileges from the cars of the Los Angeles Railway to the motor coach line. The transfer privilege to cars of the Pacific Electric Railway, and the round trip fare of 25 cents on the coach lines, are retained.

Order Revoked on Chicago Motor Coach Rights

Judge Otto Kerner of the Cook County Circuit Court in Chicago handed down an opinion on Jan. 2 which revokes an order issued last fall by the Illinois Commerce Commission permitting the Chicago Motor Coach Company to extend its operations over approximately 35 miles of streets on the northwest side of the city. The opinion held that the commission's order of Oct. 2 was invalid because it was given without a hearing of evidence and without notice to the Chicago Surface Lines and other interested parties.

The Surface Lines was seeking the right to operate feeder buses over practically the same streets in a case pending before the commission at the time it issued the order favoring the Chicago Motor Coach Company. An appeal was taken by the Surface Lines and by several civic organizations which demanded that the car lines be permitted to establish feeder bus service in that section of the city. The surface lines proposed to adopt a 7-cent fare with free transfers to all connecting car lines, while the motor coach company insisted on a 10-cent fare with free transfers.

Attorneys of the Chicago Motor Coach Company have indicated that they would take an appeal from the Circuit Court decision. The order does not affect the operations of the buses, which the company started the day after the order was entered, but simply holds that the commission acted illegally in assigning the routes to the motor coach company.

Financial *and* Corporate

Dividend Prospects Better in Ottawa

By those with a close knowledge of the company's operations, it is felt that 1929 is certain to witness the resumption of dividends on the common shares of the Ottawa Traction Company, Ottawa, Ont., so says the Canadian Financial Post.

The company paid its last dividend just a year ago and in the intervening period has obtained its fare increase. Until January, 1928, the company paid 5 per cent annually on its stock—4 per cent and 1 per cent extra.

As soon as the new fare rate went into effect, the number of passengers carried by the Ottawa trams declined substantially. The company put its rate increase into effect in August, 1928. At that time the number of passengers carried dropped off very sharply.

Recently the number of passengers carried has steadily increased, particularly during the seasonal weather of the past five or six weeks. Ultimately, it is felt the number of passengers carried can hardly fail but to creep back to the old level. Despite the first adverse results the net is now improving.

The Ottawa Traction Company operates the tramways through the ownership of virtually all the common shares of the Ottawa Electric Railway.

New Utility Investment Concern in Chicago

Formation of an investment company in Chicago with assets of approximately $24,000,000, to be known as the Insull Utility Investments, Inc., was announced on Dec. 27 by Samuel Insull, president of the new organization. Incorporation papers were filed with the Secretary of State of Illinois at Springfield. Although the assets of the company at the outset will consist primarily of substantial blocks of the common stocks of the larger public utility properties, controlled by Mr. Insull and associates, the company will have the power to acquire, hold, sell and underwrite securities of all kinds. For the present, however, it is stated the company will limit its holdings and dealings largely to public utility securities.

The company contemplates issuing publicly in the near future $6,000,000 of 5 per cent debentures and $6,000,000 of 5½ per cent prior preferred stock. Each debenture and each share of preferred stock will carry common stock subscription warrant. The details of this financing have not as yet been completed.

Martin J. Insull, brother of Samuel Insull, and Samuel Insull, Jr., will serve as vice-presidents and P. J. McEnroe will be secretary and treasurer of the new company. The directors will be Walter S. Brewster, Britton I. Budd, Edward J. Doyle, Louis A. Ferguson, George F. Mitchell, Stuyvesant Peabody.

Slight Decrease in Brooklyn City Net

For the five months' period ended Nov. 30, 1928, passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $4,609,300 against $4,645,690 for a similar period ended 1927. Operating expenses and taxes showed an increase from $4,065,633 for the 1927 period to $4,116,120 for the five months' period of 1928. After income deductions, the net corporate income was $405,624 compared with $464,189 for the five months' period ended Nov. 30, 1927.

Traffic, Fare and Wage Figures

The number of revenue passengers, including bus passengers, reported by 237 companies to the American Electric Railway Association for the month of November, 1928, compared with November, 1927, is as follows:

November, 1928	805,709,218
November, 1927	817,596,427
Decrease, per cent	1.45

This decrease in November indicates that the increase reported for October was due to the favorable distribution of the days in the month of October, compared with October, 1927, rather than to any material improvement in the trend of electric railway traffic.

The average cash fare in cities of 25,000 population and over:

	Cents
Dec. 1, 1928	8.2475
Nov. 1, 1928	8.2358
Dec. 1, 1927	8.0841

The rise in the average was due to an increase in the city of Lorain, Ohio, where on Nov. 28 the fare was increased from 5 cents straight to 8 cents cash with 5 tickets for 35 cents.

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

	Average Hourly Rate Cents	Index Number 1913=100 Per Cent
Dec. 1, 1928	57.52	211.08
Nov. 1, 1928	57.52	211.08
Dec. 1, 1927	57.29	210.24

Partial Abandonment in Columbus

Service, supplied by the Columbus Railway, Power & Light Company, Columbus, Ohio, will be abandoned in East Mound Street after Jan. 15. The Mound Street tracks have been rented from the Ohio Public Service Company.

Controversy Terminated in Ogdensburg

Articles of compromise were signed recently by Mayor W. Allan Newell and representatives of the Ogdensburg Street Railway terminating the 10-year legal controversy between the city of Ogdensburg and the company. The city received in cash $4,906 in full payment of all claims due on account of paving and the railway will pay $5,000 as its part of the contemplated paving in King Street. The city agrees to the abandonment of the entire railway and its franchise thereon. Permission is given the company to remove its rails in certain streets.

In August, 1922, the street railway was thrown into bankruptcy. A receiver was appointed and creditors enjoined from bringing any action against the company for any sum of money. The total deficit of the company was $84,181. The road carried 470,353 passengers in 1927 and provided a year-round system of transportation. As a result of the action the sum of about $10,000 will be brought into the city treasury from a bankrupt concern.

Boston Board Personnel Completed

Lester Watson, chairman of the board of directors of the Eastern Massachusetts Street Railway, Boston, Mass., has been elected by the directors as the third member of the Board of Public Trustees, the other two having been named by the Governor, as reported recently. This completes the board under the new legislation providing for a five-year extension of public control.

Long Island Company Dissolved

The Ocean Electric Railway, Far Rockaway, N. Y., under provisions of a court order, has filed a certificate of dissolution of its corporate existence in the office of the Secretary of State. This line, a subsidiary of the Long Island Railroad, has not been in operation for some time.

$4,200,000 Realized in Spartanburg Sale

The South Carolina Gas & Electric Company, serving Spartanburg and many large textile and other manufacturing centers in the Piedmont section of South Carolina, was sold recently under foreclosure to the Southern Public Utilities Company, Inc., under the laws of the State of Maine for $4,200,000. It was conducted by a special master under authority of a decree of foreclosure and sale made by the United States District Court. The action seeking to foreclose the property was brought by the Merchants and Farmers Bank of Spartanburg as trustees under a mortgage made by the South Carolina Gas & Electric Company under date of Aug. 1, 1924.

E. C. Marshall, president of the South Carolina Gas & Electric Company, is also president of the Southern Public Utilities Company, which owned 95 per cent of the common stock of the gas company. The new concern is affiliated with the Southern Power Company with headquarters in Charlotte, N. C.

Equipment of Staten Island Line Sold

Federal Judge Grover M. Moscowitz in Brooklyn on Dec. 19 signed an order authorizing Mortimer Brenner, receiver for the Staten Island Midland Railway, to accept three offers to take over items comprising the bulk of the railway's equipment.

The offers were one by the Transit Equipment Company to purchase all the company's cars, stored in the Clove Road carhouse, and two electric converters, with all equipment and appurtenances, for $10,000; another by the Irving S. Van Loan Corporation to purchase all the wire—trolley wires, feed wires, etc.—for $24,000; and a third by the Tompkins Bus Company to rent the substation and carhouse at Concord for $416.67 a month.

All parties interested in the railway, which has been inoperative for some time, consented to accept the offers.

Sale of Tulsa Property

The Tulsa Street Railway, Tulsa Okla., will be sold at auction at the courthouse there on Jan. 23, according to C. Kline, receiver. Total holdings of the company have been appraised at $350,000.

The United States District Court for the Northern District of Oklahoma recently entered a decree giving the Seaboard National Bank of New York City judgment against the Tulsa company for $546,561, also giving the bank power to foreclose the lien of the mortgage for that amount. A forced sale is the result of this court ruling. No bids for the property, Mr. Kline stated, would be received unless accompanied by a certified check for $25,000, payable to the receiver, and unless the bid totals at least two-thirds of the appraised value.

Freight Service in Providence Discontinued

The United Electric Railways, Providence, R. I., by a decision handed down by the Public Utilities Commission, Dec. 24, is permitted to discontinue all its trolley freight service throughout the state, with the exception of one small line and a switching service in connection with the New Haven Railroad in Providence.

It did not petition for discontinuance of the switching service but had asked to be allowed to discontinue the other trolley freight service.

The report of the commission says:

A study of the traffic figures and revenues of the suburban trolley lines shows a steady decline. The question naturally arises as to whether the future of trolley transportation, covering the suburban communities above mentioned (in Rhode Island), is sufficiently secure to warrant the expenditure necessary to renew tracks and structures with a useful life of some 25 years.

Albany System Sold

Properties controlled by Delaware & Hudson, of which Mr. Loree is head, pass to control of E. L. Phillips, owner of Rochester and Syracuse lines

ELLIS L. PHILLIPS, New York, announced on Jan. 3 that he was completing the purchase of the United Traction Company, serving Albany and vicinity, and of the balance of control in the Schenectady Railway, from the Delaware & Hudson Company. In June Mr. Phillips acquired the New York State Railways, which had a half-interest in the Schenectady property, and the Mohawk Valley Company for $41,758,000 from the New York Central. On behalf of Mr. Phillips it was said:

We believe in the future of traction properties if properly located in suitable cities and properly managed. Its continuance is inevitable and essential to the welfare of our cities.

The sale of its utilities by the D. & H. is consistent with policies the railroad has recently followed. Only a short while ago the Delaware & Hudson Railroad Corporation was formed by its officers to acquire all its railroad properties except those in Canada, which are being sought by the Canadian National Railways. Reports have had it that the Delaware & Hudson would sell its iron mines and Adirondack hotels. While retaining its coal properties, the Delaware & Hudson is divesting itself of properties not immediately associated with railroad operation and is, therefore, putting the Delaware & Hudson lines in a position where they may readily be merged in any eastern consolidation. At the head of the Delaware & Hudson is L. F. Loree, who several years ago said that the $6,000,000,000 investment in electric railways in the United States should be written off.

Mr. Phillips's associates in the New York Central deal were described as the Manufacturers' Trust Company and W. C. Langley & Company, but these organizations would seem to be acting merely in a financial capacity. Mr. Phillips said on Jan. 3 that his associates in both deals were the same, but went no further.

The consideration in Mr. Phillips's latest deal was not disclosed. Albany advices said he would pay $1,250,000 in cash and assume more than $6,000,000 in debts, but Mr. Phillips said that the price and obligations to be assumed were not yet definitely fixed.

The United Traction Company operates electric lines in Albany, Rensselaer, Troy, Watervliet, Cohoes and Waterford, with a mileage of more than 97, and it owns the Capitol District Transportation Company, Inc., which operates trackless trolleys in Cohoes and buses in Rensselaer. It also operates gasoline-electric buses in Cohoes, Troy, Rensselaer and Albany.

The Schenectady Railway, which Mr. Phillips now controls fully through his purchases from the D. & H. and the New York Central, operates 140 miles of electric lines in Schenectady, Albany and Saratoga Counties. The New York State Railways owns and operates the city lines in Rochester, Syracuse, Utica and Oneida, interurban lines, and certain suburban lines in the vicinity of Syracuse. It leases from the West Shore Railroad the electrified line between Utica and Syracuse.

A sketch of Mr. Phillips was published in the JOURNAL for June 16, 1928, at the time the deal was announced under which he took over the electric railway holdings of the New York Central Railroad.

Formal Cessation of Service by Milford Company

The Milford & Uxbridge Street Railway Milford, Mass., operated its last car over the route Dec. 31 and, with the ringing in of the new year, went out of existence. This company was originally chartered to give transportation service in the towns of Framingham, Hopkinton, Holliston, Medway, Hopedale, Mendon, Uxbridge, Grafton and Upton. Service in the section will be taken care of by buses. The Milford, Framingham & Uxbridge Coach Company will place in service additional buses to take care of that territory, while the Johnson Bus Lines Company will give the required service between Milford and Boston via Medway, and between Milford and Worcester via Grafton, Upton and Hopedale.

Would Discontinue a Buffalo Line

Application was made by the International Railway on Dec. 27 to the Public Service Commission for approval of a declaration of abandonment of its line in Best Street, Buffalo, from Genesee Street to Elm Street.

The company alleges that this portion of its line is no longer necessary for successful operation; that the expenses of maintenance and operation is in excess of revenues, and that public patronage has greatly decreased because the line is unnecessary.

Legal Notes

ALABAMA — *Company Responsible for Injury to Child from Unguarded Vessel on Street.*

While engaged in street work, employees of an electric railway company used a vessel in which a fire was burning, and while it was unguarded a child came in contact with it and was injured. The company was held responsible even though the vessel might not be considered especially attractive to children. [Birmingham E. Co. vs. Kirkland, 118 S. 640.]

CIRCUIT COURT OF APPEALS—*Assessment of Road Tax on Railroad Held Unconstitutional.*

One of the road laws of Arkansas relative to the construction of highways requires railroads to construct crossings and defined a crossing to embrace all of the highway line within the boundaries of the railroad's right of way. In addition, it required payment of assessments on railroads as taxpayers. This law was held a violation of the Federal Constitutional Amendment No. 14, guaranteeing due process and equal protection. [Road Improvement District No. 7 vs. St. Louis-San Francisco R. Co., 28F. (2d), 825.]

CONNECTICUT — *Burden of Proof on Pedestrian.*

The burden of establishing the conditions required for the application of the last clear chance doctrine, where a pedestrian has been struck by a street car and sues for damages, rests upon the pedestrian. [Budaj vs. Connecticut Company, 143 A., 527.]

INDIANA — *Company Responsible for Boarding Accident at Point Only Recently Abandoned as Stop.*

A police order changed the location of a bus stop from one side of the street to the other side and notified the bus company which notified its drivers. Two hours after the order went into effect a bus stopped at the former stopping point, not to receive and discharge passengers but in obedience to a traffic signal. A person attempted to board the bus at this point to take passage, but was not seen by the driver and was injured after the bus started by being crushed between the bus and a parked automobile. The court held there was an implied implication to enter the bus and that the company was responsible. [Stradling vs. Hahn, 163 N.E., 527.]

KENTUCKY—*Duty of Bus Driver When Meeting Cattle on Road.*

A statute required the operator of any motor vehicle, when on a public highway, to operate it in a careful manner, with due regard to the safety of pedestrians and that of the traffic upon the highway. In another section the statute dealt with his duties to prevent the frightening of any animal "being ridden or driven" on the highway. Where a bus collided with the cattle which had spread over the entire width of the highway, the court held that the prescribed statutory precautions in such cases were not exclusive but were cumulative to those required by the common law, and a verdict for the owner of the cattle was upheld. [Consolidated Coach Corporation vs. Sphar 10 S. W., (2d), 482.]

MASSACHUSETTS—*Dangers Assumed by Truck Laborer.*

Under the Massachusetts law, a street railway track laborer assumed obvious risks incident to street employment of laborers, but he did not assume risks which arose in part from the neglect of duty of fellow servants. Where a track laborer was injured by a passing automobile which got out of line after it had passed the superintendent in charge of the gang, a verdict directed by the trial court for the defendant was sustained by the Supreme Judicial Court. [Pagano vs. Worcester Consolidated Street Railway, 163 N. E., 764.]

MICHIGAN — *Anti-Jitney Law Held Valid.*

An ordinance relating to the regulation of jitneys was held not to vest arbitrary authority in the Mayor in permitting him to grant, refuse or revoke licenses, where the ordinance specified the age, character, etc., of the owners and drivers to whom the license should be issued, and thus set up certain standards which must be met. It was not invalid because of depriving the Public Utility Commission of jurisdiction, because the city had a constitutional right to reasonable control of its streets. It was not discriminatory because it permitted the police to allow outside jitneys to use certain streets, while withdrawing such use from resident owners and drivers, since it prohibited all jitneys from using certain streets. The court did not determine the validity of a provision limiting the granting of licenses to residents of the city, where no non-resident was before the court asking for a license, nor did it determine the validity of a provision requiring bonds to be furnished as indemnities from damage, where no driver or owner was before the court seeking a license without a bond. [Red Star Motor Drivers' Association et al. vs. City of Detroit, 221 N.W., 622.]

MISSOURI—*Duty of Guest in Automobile.*

A guest or passenger in an automobile about to cross a railroad track need not exercise the same vigilance as the driver, but must use ordinary care. If he knew, or should have known, of danger at a railroad crossing and the driver had no knowledge of it, or if he had a clear view of an oncoming train and failed to warn the driver, he was contributorially negligent. [Cox vs. St. L. & St. F. Ry. 9 S.W. (2d), 96.]

NEW JERSEY—*Court Will Not Interfere In Matter Determined by Discretion of Commission.*

When the Public Utility Commission acts on applications for certificates of convenience and necessity, the Supreme Court will not disturb its opinion unless it appears that the commission reached its conclusion by manifest violations of law or by clear abuse of its discretion. The commission refused a franchise to a bus company to operate in competition with another public utility, although the bus company offered to carry passengers for a lower fare. The Commission gave as its reason "public interest," not necessarily the public in the immediate locality, but the interest of the general public. The court held that this reason was adequate for the refusal to grant the certificate. [Fornarotto et al. vs. Board of P. U. Com. of N. J., 143 A., 450.]

OHIO—*Damages to Property Need Not Be Set Forth In Detail.*

A railway car jumped the track and crashed into a house. When damages to the amount of $6,000 had been awarded in the trial court, the company appealed on the ground that the different items of damages should have been listed with the amount of damages claimed for each item, and that the loss of use of the ground floor for business purposes and of good will for a period of time should be cancelled. The Court of Appeals held that the fixing of value on each item of property damage was not necessary, and that the amount of the verdict was supported by the evidence. [Cincinnati St. Ry. Co. vs. Hickey 163 N.E., 310.]

OHIO—*Utilities Commission May Consider Motive of Applicant for a Certificate of Convenience and Necessity.*

Where an applicant for a certificate for an interstate motor bus line was refused a certificate by the commission because, among other reasons, it believed that he intended to do an intrastate business, its action was upheld by the Supreme Court. [Interstate M. T. Co. vs. Public Utilities Comm. of Ohio. 163 N.E., 713.]

PENNSYLVANIA—*Care at Crossing Required of Car Operator.*

Street cars must exercise a certain control at public crossings to the extent of slackening speed to aid others under stricter control to avoid accidents, but a charge requiring the motorman to have the street car at a crossing under such control that he can stop it to avoid an accident placed too great a burden on the carrier and was error. [Weschler vs. Buffalo and L. E. T. Co., 143 A, 119.]

Personal Items

J. B. Trumbull—Holds New Office With New Haven

James B. Trumbull, Wollaston, Mass., at one time principal assistant engineer in charge of the electrification of the New York, Westchester & Boston Railroad, has been appointed industrial development agent in the territory served by the eastern lines of the New York, New Haven & Hartford Railroad with offices at the South Station, Boston, Mass., and the Union Station, Providence, R. I. Mr. Trumbull became connected with the New Haven on May 29, 1926, and has been affiliated with the various branches of the engineering department. He has had charge of the construction work at Boston, Worcester, Providence and New York.

H. I. Harriman—Chairman Boston Elevated

Henry I. Harriman, one of the new members of the Board of Public Trustees of the Boston Elevated Railway, Boston, Mass., has been elected chairman of the board. He is now president of the Boston Chamber of Commerce for his second term in office, and has for more than five years served as chairman of the metropolitan planning division, in addition to carrying many other responsibilities both public and private in nature. In acceding to the Governor's request that he accept public service as one of the trustees of the Elevated, Mr. Harriman made it a condition that he should be allowed to retire from his post as chairman of the metropolitan planning division.

E. A. Armstrong Retires

After more than 40 years service with the Public Service Corporation of New Jersey and its predecessors, Edward Ambler Armstrong, associate general counsel, has retired. He was local counsel of Public Service in Camden, N. J., for many years and became assistant general counsel in 1911.

E. M. Lunda Assumes New Duties in Toledo

Ernest M. Lunda, formerly superintendent of shops and equipment for the Grand Rapids Railroad, winner of the 1927 Coffin award, has been appointed superintendent of equipment of the Community Traction Company, Toledo, Ohio. This appointment was announced by C. H. Forsgard, general superintendent.

Mr. Lunda was graduated from the University of Wisconsin in 1922, having taken a degree in electrical engineering and having specialized in the electric railway field. For the first three years out of college he was general master mechanic of the Wisconsin Public Service Corporation properties at Green Bay and Manitowoc, Wis. He joined the Grand Rapids Railroad in 1925.

He will have headquarters at the Central Avenue carhouse, now the center of all railway and bus activities of the company, and will have general engineering oversight over all buses, cars and garages.

Other changes in Toledo follow:

P. J. Kearney, formerly inspector, has been named division superintendent of the Community Traction Company, in charge of street cars operating out of the Central Avenue carhouse.

A. L. Snyder, division superintendent, has been placed in charge of bus operations.

W. C. Hopkins, for twenty years in the service of the company as inspector and later division superintendent, has resigned.

Change in Journal Staff Organization

TO PERMIT him to devote his entire time to the technical side of electric railway operation with which he is intimately familiar from long experience, Morris Buck, managing editor of this paper since 1925, has been appointed engineering editor effective Jan. 1. At the same time, John A. Miller, Jr., associate editor since 1925, becomes acting managing editor. With local transportation becoming more and more a matter of engineering economics, it was felt that greater advantage should be taken of the wide experience of Mr. Buck along these lines, not possible under the conditions incident to his discharging the duties of managing editor, duties that do not permit of the original research for which he is especially fitted by temperament and training. On the other hand, the duties of managing editor fit in more closely with other work that Mr. Miller is doing at the present time.

Mr. Buck's connection with the paper dates from 1923, when he resigned from the Beeler Organization, consulting engineers of New York City, to take the position of associate editor of the JOURNAL. He continued in that capacity until 1925 when he became managing editor. His experience in the electric railway field has been long and varied, since he received the degree of mechanical engineer from Cornell University in 1904. It includes work as engineer for the Westinghouse Electric & Manufacturing Company and the Mechanical Appliance Company, cost analyst for the Mellon National Bank of Pittsburgh and special apprentice with the Delaware, Lackawanna & Western Railroad, operating out of New York.

For six years Mr. Buck was assistant professor of railway electrical engineering at the University of Illinois, from which institution he received the degree of electrical engineer. At this time he became well known in the electric railway field for original work done in the solution of electric railway engineering problems by graphical methods and for his text-book "The Electric Railway." Other teaching experience of Mr. Buck included a year as professor of electrical engineering at Clarkson College of Technology, two years as assistant professor of electrical engineering at New Hampshire State College and one year as instructor at Cornell.

During the seven years Mr. Buck was associated with the Beeler Organization, he had charge of important investigations of electric railways throughout the country, including surface, rapid transit and interurban lines. Among the properties which he studied are those of Boston, New York, Philadelphia, Washington, Newark, Richmond, Chicago, Kansas City and New Orleans. This work involved a wide range of operating and engineering problems which will prove of inestimable value in his future activities as engineering editor of the JOURNAL.

Mr. Miller's connection with the JOURNAL also began in 1923. Prior to that time he had been connected with the Public Service Railway of New Jersey more than seven years. After his graduation from Yale in 1915, he started work as a cadet engineer on that property. He worked as rodman and transitman in the track department, as test engineer in power stations, as shopman in the mechanical department and as lineman in the electric distribution department. During the World War, he served overseas as a lieutenant in the 104th Regiment of Engineers. Returning to the employ of the Public Service Railway he worked as car timer, motorman, conductor, assistant supervisor of the Montclair Division, later being made special instructor of safety car operation in Paterson and instructor at the trainman's school at Hoboken. In 1921 he was made traffic investigator, a position which he held for two years until he joined the editorial staff of the JOURNAL as editorial assistant. He was promoted to assistant editor in 1924 and to associate editor in 1925.

JAMES J. CLARK, for the past nine years connected with the equipment department of the Eighth & Ninth Avenues Railway, New York City, N. Y., as general foreman, has joined the sales department of the Galena Signal Oil Company. Previous to his affiliation with the Eighth & Ninth Avenues Railway he was with the New York Railways.

JAMES E. MURRAY has succeeded C. B. Melton as assistant treasurer of the Eastern Texas Electric Company, Beaumont, Tex.

Additional Construction Livens Market

New York board will receive bids on construction of Brooklyn Subway. $357,000 grade crossing eliminations in Milwaukee ordered. Reading Transit Company plans improvement

ON FEB. 5, the New York Board of Transportation will receive bids for the construction of part of the Fulton Street Subway in Brooklyn from St. Felix Street to Washington Avenue and along Lafayette Avenue from Fulton Street to South Oxford Street, as well as from the second section of the Fulton Street Line from Washington Avenue to Nostrand Avenue.

The Board of Transportation also set Jan. 29 as the date for the receipt of bids for contractors on the contract to build the section of the proposed Schermerhorn Street route between Bond and St. Felix Streets, Brooklyn. The Schermerhorn Street route, as proposed in plans for the new system, will connect the East River Tunnels under Jay and Cranberry Street with the Fulton Street and Brooklyn crosstown lines, which are laid out to converge in the downtown Brooklyn district.

In Brooklyn only two short elevated sections of the Jay-Smith Street Culver Line remain to be contracted for to put the city's new system under construction from the upper Bronx to Coney Island.

Additional Contracts to be Let

One of the principal projects on the board's program for work in Brooklyn and Queens during the new year is the completion of the proposed Queens Boulevard subway line which will connect the Eighth Avenue subway in Manhattan with Jamaica, Queens. Twenty-nine contracts covering construction of all routes of the line not under contract at the present time, are to be let during the year.

Contract awards and bids for eighteen sections of New York City's new independent subway system in 1928 reached $77,000,000. This amount exceeded the awards for the same purpose in 1927 by $9,000,000. The contracts covered principally construction work in Brooklyn, the Bronx and Queens, and the total awards since 1925 amount to $295,853,825. The Board of Transportation's rapid transit construction contract awards in 1928, including those applying to the existing privately operated lines, reached the grand total of $80,733,714.

The total of $259,853,825 for the city's system includes 29 miles of routes in Manhattan, Queens, Brooklyn, and the Bronx, $248,108,184; 24 stations along the main line on Eighth Avenue, Manhattan, $2,903,401; for 104 miles of track from Harlem River Shops and Yards at 207th Street to the lower end of Manhattan, $1,574,237. Miscellaneous items totaled $7,268,003, nearly $6,000,000 of which was for the 207th Street Yards and Shops and those at Jerome Park.

Actual payments on rapid transit contracts reached a total of $81,706,023 in 1928, of which $72,952,782 was for the City System work, exceeding the 1927 mark for that purpose by $22,000,000. Since 1925 the Board of Transportation has approved vouchers for city subway system contracts amounting to $173,082,024. For the same period the vouchers approved, covering all transit systems in the city, totaled $225,960,000.

Milwaukee Construction

The Wisconsin Railroad Commission has ordered grade crossing eliminations to be made, at a cost of $357,000, along the Northern Interurban Line of the Milwaukee Electric Company, Milwaukee, Wis. Ellers Street, Roosevelt Drive, and Silver Springs Road will be constructed to pass over the track right-of-way and the Hampton Road and Villard Avenue crossings will pass under the tracks. The city will be required to pay $58,000, the town of Milwaukee, $60,000, the county $20,000, and the Milwaukee Electric Company to pay the balance. The order calls for the completion of the grade crossing eliminations by Dec. 31, 1929.

Five new Twin Coach passenger buses have been ordered by the Virginia Electric & Power Company, Richmond, Va., from the Twin Coach Corporation at Kent, Ohio. These coaches are now being completed, and it is expected to place them in service on the streets of Richmond within a few weeks. This fleet of five buses represents an investment of $60,000, and brings the total number of buses now operated by the company up to 80.

Sioux City Service Rebuilding Cars

Sioux City Service Company, Sioux City, Iowa, has rebuilt eight of its street cars as the first step toward the rehabilitation of all rolling stock owned by the company. The rebuilt cars will be more powerful, swifter, more convenient for operation, and neater in appearance. The work is being done in the shops of the company in Sioux City.

The larger type cars will have four 30-hp. motors instead of the two 40-hp. motors now used. This change is expected to enable the cars to maintain an average speed of 11 miles an hour including stops, instead of 9 miles an hour, and will have a greatly increased acceleration. The small Birney type cars will have no motor change, but the equipment in these cars will be thoroughly overhauled. The switching and control equipment at the front of the cars is being enclosed entirely in cabinets, and the operator's platform has been slightly raised. The fenders are of new spring construction.

The cars are being painted with a bright orange enamel, and a light blue and cream trim. The interior work and sashes are finished in mahogany. The seats have been recovered with new rattan, finished in ivory Duco. Linoleum flooring material has been used to replace the old open work. The large cars will seat 46 passengers, and the small Birney type will provide seats for 33 passengers. The lighting arrangement has been redesigned to eliminate glare.

Reading Transit Making Plans

Although plans are not completed for the 1929 program of the Reading Transit Company, Reading, Pa., tentative plans call for the usual amount of repair and maintenance work. Switches and crossovers are to be placed at Fifth and Penn Streets, and also at Second and Penn Streets. Tentative program provides for the complete rebuilding of about fifteen blocks of track in the city of Reading. The most expensive of this company's construction job completed in 1928 was the rebuilding of the track in the Borough of Shillington in connection with the construction of the new concrete highway. A number of other important construction changes were made.

The Houston Electric Company, Houston, Tex., has placed in operation one of the new 44-passenger Twin Coach street cars. They are constructed by the Twin Coach Corporation, Kent, Ohio. This car, which weighs 17,000 lb., will be thoroughly tested before it is put in service. In addition to this new type of car, the company expects to receive in the very near future one of the new light-weight Birney type cars constructed by the St. Louis Car Company.

The Chicago, North Shore, and Milwaukee Railroad, Chicago, Ill., has purchased from the Union Switch & Signal Company, track circuit materials required for the control of crossing gates at 26 locations on its lines. Included in the equipment ordered are 79 single impedance bonds, 60 a.c. relays, 40 track transformers, 26 copper oxide rectifiers, and the necessary accessories. The recommendation to the Interstate Commerce Commission by the examiner incorporates a finding that public convenience and necessity are not shown to require the construction of the proposed branch line of the Sacramento Northern Railway, Sacramento, Cal., from Vacaville Junction to Creed, Cal., a distance of 7.5 miles. It was pointed

out that, while the line would be of use in connecting the Suisun Branch with the remainder of the company's system, the existing connection, by means of the Southern Pacific Railway, is not shown to be inadequate to a degree indicating the need for the construction of a line giving parallel service.

Work has been started on the completion of the track zone on Breese Terrace, on which a double track will be laid by the Madison Railways, Madison, Wis. Approximately $80,000 has been spent on track construction by the British Columbia Electric Railway, Vancouver, British Columbia, during the year 1928. A large amount of this work was on the Vancouver and New Westminster City Interurban and Fraser Valley Lines. The West Penn Railways, Pittsburgh, Pa., has completed the installation of $40,000 worth of new machinery in its Connellsville shops.

Rolling Stock

It is reported that the Allegheny Valley Street Railway, New Kensington, Pa., will place orders in the near future for a number of new cars. It is expected that this new equipment will be put in service during the coming spring. The Los Angeles Motor Coach Company, Los Angeles, Cal., has ordered six urban type Twin Coaches and the Los Angeles Railway Corporation has ordered two urban type Twin Coaches. The Union Traction Company of Anderson, Ind., has received permission from the Indiana Public Service Commission to extend its motor bus routes in the city of Muncie, Ind. The Northern Ohio Power & Light Company, Akron, Ohio, has placed orders for six urban type Twin Coaches.

The Key System Transit Company, Oakland, Cal., has purchased ten Twin Coaches. Bus service will soon be started between Granite City, Ill., and St. Louis, Mo., by the Illinois Power & Light Corporation. The United Electric Railway, Providence, R. I., has ordered five express buses from the Twin Coach Corporation, and the Boston Elevated Railway, Boston, Mass., has received five urban type Twin Coaches. Permit to operate freight carrying motor trucks, in addition to passenger carrying motor coaches, has been granted to the Southern Michigan Transportation Company, Jackson, Mich. This company is controlled by the Michigan Electric Railway.

An equipment storage and distributing plant to cost $45,000 is planned by the St. Louis Service Company, St. Louis, Mo. The purchasing department of the city of Seattle has opened bids for 30,000 ft. of 600-volt copper wire.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	Jan. 2, 1929
Metals—New York	
Copper electrolytic, cents per lb.	16.5
Copper wire, cents per lb.	18.375
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	49.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.50
Central, Ill., screenings, Chicago, net tons	1.20
Kansas screenings, Kansas City, net tons	1.80
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.5
Weatherproof wire base, N. Y., cents per lb.	19.25
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.4
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.2
Turpentine (bbl. lots), N. Y., per gal.	.6675

Weekly Business Conditions

The volume of money turnover during the week ended Dec. 29, 1928, was greater than in the corresponding week of 1927, according to the weekly statement of the Department of Commerce. Operations in steel plants were on a higher level than in either the preceding week or the same period of the preceding year. Petroleum output during the last reported week was running higher than in either the previous week or the same period of the preceding year. Bituminous-coal production was also greater than in either period.

Prices for iron and steel showed no material change from the previous week but were higher than a year ago. Copper prices were also higher than in either the previous week or the corresponding period of 1927.

Loans and discounts of federal reserve member banks showed further expansion. Interest rates on time money averaged higher than in either the previous week or in the same period of 1927. Prices for stocks averaged higher than in the previous week. Bond prices showed a fractional gain over the preceding week but were still below the level of 1927.

Dallas Cars Delivered

Seventeen two-man, motor, passenger cars have been delivered to the Dallas Railway & Terminal Company, Dallas, Tex., by the St. Louis Car Company. These cars, which were fully described in the Aug. 4 issue of Electric Railway Journal, are of the double end, double truck Peter Witt city type, and seat 42 passengers, exclusive of the four seats, one of which is across each end door.

The cars are 45 ft. 8½ in. long, 8 ft. 5 in. wide, and weigh 39,300 lb. The bodies are semi-steel construction with arched roofs and both center and end doors. The center side doors are sliding, and the end doors are folding types. The rear exit doors are treadle operated. The trucks are equipped with 26-in. steel wheels, and two inside hung motors. The truck wheelbase is 5 ft. 4 in. Heat treated axles and plain type journal and armature bearing are used.



The new Dallas cars are finished in green and ivory enamel

TRADE NOTES

Wagner Electric Corporation, St. Louis, Mo., announces the addition of N. H. Spencer to its Dallas, Tex., sales force. His experience includes the office of manager of the Olean Electric Light & Power Company, Olean, N. Y.; district manager of the Niagara, Lockport & Ontario Power Company from 1914 to 1919; and eight years with the Pittsburgh Transformer Company, Pittsburgh, Pa.

George Shields, for the past ten years sales representative of the Dayton Manufacturing Company, Dayton, Ohio, has been transferred to New York City with the title of Eastern Sales Manager with offices at Room 918 Havemeyer Building, 25 Church Street. Before going with the Dayton Manufacturing Company, Mr. Shields was connected with the American Car Company, St. Louis, Mo.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923–25 = 100)

	1928				1927			
	Dec. 29	Dec. 22	Dec. 15	Dec. 8	Dec. 31	Dec. 24	Dec. 17	Dec. 10
Steel operations	107.9	105.3	107.9	110.5	75.0	88.0	83.0	80.0
Bituminous-coal production	.....	113.8	113.2	115.0	81.5	100.7	100.4	99.4
Lumber production	.....	85.0	90.0	92.3	57.3	88.2	102.3	104.5
Petroleum production (daily average)	.....	122.5	122.3	121.0	116.2	116.8	118.0	119.4
Bldg. contracts 37 states (daily average)	.....	105.5	101.6	106.0	104.4	121.1	124.9	142.9
Price iron and steel, composite	.....	87.5	87.5	87.3	84.7	84.8	84.8	84.8
Copper, electrolytic, price	.....	114.5	114.5	114.5	100.0	100.0	99.3	100.8
Interest rates, call money	251.5	178.8	190.9	218.2	133.3	103.0	97.0	103.0
Interest rates, time money	191.4	188.6	177.1	168.6	97.1	97.1	97.1	97.1
Federal reserve ratio	79.5	83.2	82.8	83.6	86.2	86.7	89.3	91.2

IF-



IF you are looking for a hand brake with *Great Power*

IF you insist the brakes must work with *Speed*

IF you demand *unlimited capacity* (to take up slack chain in times of need)

IF *platform space and weight* is worth consideration

IF *low maintenance* affects the profits that you make

Weigh well economy and safety
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The Ellcon Co., General Sales Representatives, 50 Church St., New York



DAKA INKUBU

The Kaffir hates the swarms of locusts that eat his crop.

But when they do come in droves he gathers them up for *daka inkubu,* which is a very tasty locust pudding.

In that way, while he loses in plebeian corn, he gains in aristocratic pudding.

So that his *net* gain or loss is approximately the same as that of the operator who replaces a set of special-feature carbon brushes with a set of some-other-special-feature brushes—corn loss with locust gain.

On the other hand Morganite brushes can be applied with over-all gain and to effect a very definite saving in cost per year.

We are almost tempted to say that they give you locust per year.

Morganite Brush Co., Inc.

Main Office and Factory
3302-3320 Anable Ave., Long Island City, N. Y.

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building.
Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Electrical Engineering Sales Co., 502 Delta Bldg.
San Francisco, Electrical Engineering Sales Co., 222 Underwood Bldg.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 133 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 898 St. Antoine St.
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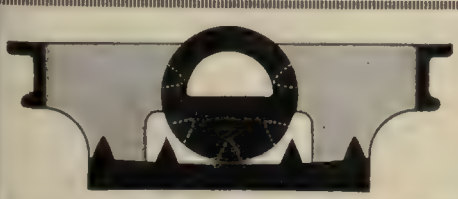
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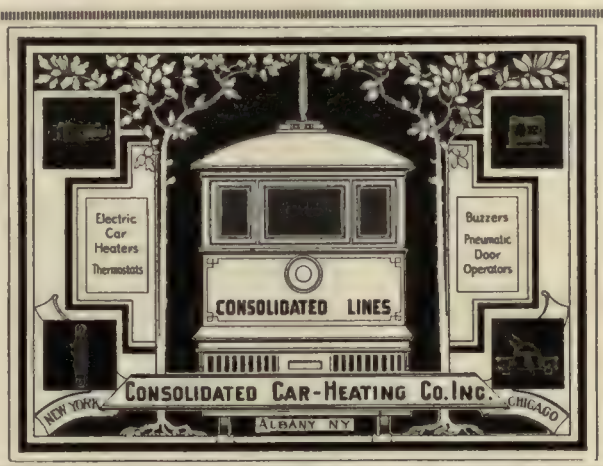
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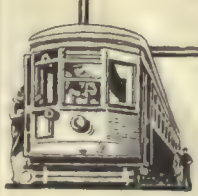
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Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Air Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Axles (Front & Rear) Motor Truck & Passenger Car
Timken-Detroit Axle Co.

Axles, Trailer & Motor Bus
Timken-Detroit Axle Co.

Babbitting Devices
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International Register Co.

Batteries, Dry
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Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Westinghouse E. & M. Co.

Bearings, Center & Roller Side
Columbia Machine Works
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Bells and Buzzers
Consolidated Car Htg. Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

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Railway Track-work Co.

Bodies, Bus
Brill Co., The J. G.

Bolts, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

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Ohio Brass Co.
Railway Track-work Co.
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General Electric Co.
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Brill Co., The J. G.
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Bemis Car Truck Co.
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Cincinnati Car Co.
Columbia Machine Works
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Cincinnati Car Co.

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Morganite Brush Co., Inc.
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Brushes, Graphite
Morganite Brush Co., Inc.

Brushholders
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General Electric Co.

Buses
General Electric Co.
White Co., The

Bushings, Case Hardened & Manganese
American Steel Foundries
Brill Co., The J. G.
Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Works

Cables, (See Wires & Cables

Cambric Tapes, Yellow and Black Varnish
General Electric Co.
Mica Insulator Co.

Carbon Brushes (See Brushes, Carbon)

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Westinghouse E. & M. Co.

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Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
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Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Brill Co., The J. G.

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Columbia Machine Works

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American Steel Foundries
Bemis Car Truck Co.
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Castings, Malleable & Brass
Bemis Car Truck Co.
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Heywood-Wakefield Co.

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Westinghouse E. & M. Co.

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Crossings, Frog and Switch
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Ramapo Ajax Corp.

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Wish Service, Edward P.

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Cincinnati Car Co.
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Bethlehem Steel Co.
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Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

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Frogs, Trolley
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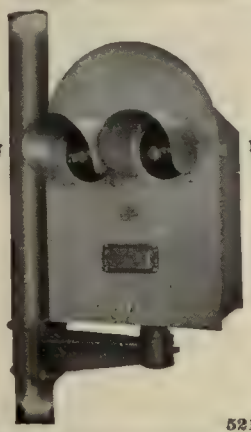
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(Continued on page 28)



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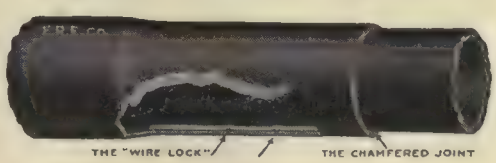
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Elec. Service Supplies Co.
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General Electric Co.
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Heywood-Wakefield Co.
Pantasote Co., Inc., The

Seats, Bus
Brill Co., The J. G.
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Seats, Car (See also Rattan)
Brill Co., The J. G.
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Brill Co., The J. G.
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General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars, Passenger (See Cars, Passenger, Freight, Express, etc.)

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

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Switches, Selector
Nichols-Lintern Co.

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Consolidated Car Htg. Co.
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Switches, Track (See Track Special Work)

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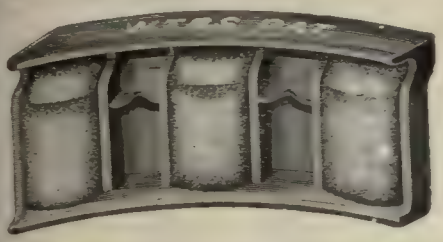
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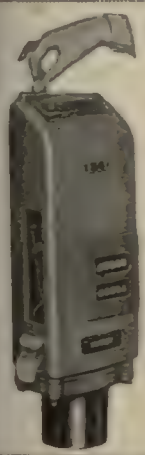
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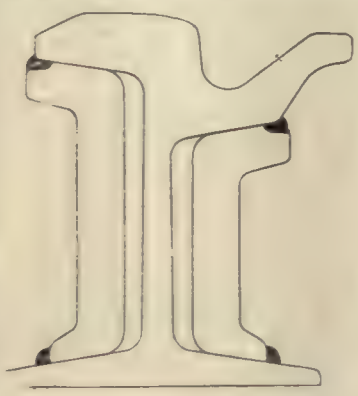


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ALPHABETICAL INDEX TO ADVERTISEMENTS

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— A —

	Page
American Brass Co., The	29
American Car Co.	Third Cover
American Insulating Mach. Co.	27
American Steel Foundries	8
Anaconda Copped Mining Co.	29

— B —

Beeler Organization	22
Bell Lumber & Pole Co.	29
Bemis Car Truck Co.	23
Bethlehem Steel Company	23
Brill Co., The J. G.	Third Cover
Buchanan & Layng Corp.	22
Byllesby Eng. & Management Co.	22

— C —

Carey & Co., Philip	10
Cincinnati Car Co.	4
Cleveland Fare Box Co.	23
Collier, Inc., Barron G.	14
Columbia Mach. Wks. & M. I. Co.	27
Consolidated Car Heating Co.	23

— D —

Differential Steel Car Co., The	27

— E —

Earll, C. I.	20
Electric Service Supplies Co.	9
Electric Ry. Equipment Co.	27

— F —

Faile & Co., E. H.	22
Firestone Tire & Rubber Co.	21
Ford, Bacon & Davis	22
"For Sale" Ads.	25

— G —

General Electric Co.	18
Globe Ticket Co.	15
Goodyear Tire & Rubber Co.	12

— H —

Hale-Kilburn Co.	29
"Help Wanted" Ads.	25
Hemphill & Wells	22
Heywood-Wakefield Co.	13
Holst, Englehardt W.	22

— I —

International Register Co.	23
International Steel Tie Co., The	7

— J —

Jackson, Walter	22
Johnson Fare Box Co.	29

— K —

Kelker, DeLeuw & Co.	22
Kuhlman Car Co.	Third Cover

— L —

Lorain Steel Co.	24

— M —

McClellan & Junkersfeld	22
McGraw-Hill Pub. Co., Inc.	16, 17
Mica Insulator Co.	24
Morganite Brush Co., Inc.	20

— N —

Nachod and U. S. Signal Co.	23
National Brake Co.	19
National Pneumatic Co.	11
National Ry. Appliance Co.	27
Nichols-Lintern Co., The	23

— O —

Ohio Brass Co.	5
Okonite-Callendar Cable Co.	29
Okonite Co., The	29

— P —

Pantasote Co., The	24
Perey Mfg. Co., Inc.	23
Positions Wanted and Vacant	25

— R —

Rail Joint Co., The	29
Railway Track-work Co.	29
Railway Utility Co.	29
Ramapo Ajax Corp.	29
Richey, Albert S.	22
Roebling's Sons Co., John A.	23

— S —

Sanderson & Porter	22
Scarr Transport. Service, Inc.	22
Searchlight Section	25
Smith Heater Co., Peter	29
Standard Steel Works Co.	20
Star Brass Works, The	27
Stevens & Wood, Inc.	22
Stone & Webster	22
Stucki Co., A.	23

— T —

Timker Detroit Axle Co.	Back Cover

— U —

Una Welding & Bonding Co.	23

— W —

"Want" Ads.	25
Wason Mfg. Co.	Third Cover
Westinghouse-Nuttall	2nd Cover
Westinghouse Traction Brake Co.	6
Wharton, Wm., Jr. & Co., Inc.	27
What and Where to Buy	26, 28, 30
Wheel Truing Brake Shoe Co.	29
White Co., The	Front Cover
White Eng. Corp., The J. G.	22
Wish Service, The P. Edw.	23

SEARCHLIGHT SECTION

Classified Advertising

Classification	Page
BUSINESS OPP.	25
EMPLOYMENT	25
USED AND SURPLUS EQUIPMENT	25
Chicago, No. Shore & Milwaukee Railway	25
Electric Traction & Bus Co.	25
White Co., The	25

WHAT AND WHERE TO BUY—Continued from page 28

Trolley Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Trucks, Motor
White Co., The

Truss Planks
National Tube Co.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Turntables
Elec. Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnishes (See Paints, etc.)

Ventilators
National Ry. Appliance Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Htd. Co.
Nichols-Lintern Co.
Railway Utility Co.

Welded Rail Joints
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Railway Trackwork Co.
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Welders, Portable Electric
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
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General Electric Co.
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Wheel Guards (See Fenders and Wheel Guards)

Wheel Grinders
Wheel Truing Brk. Shoe Co.

Wheel Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tired
American Steel Foundries
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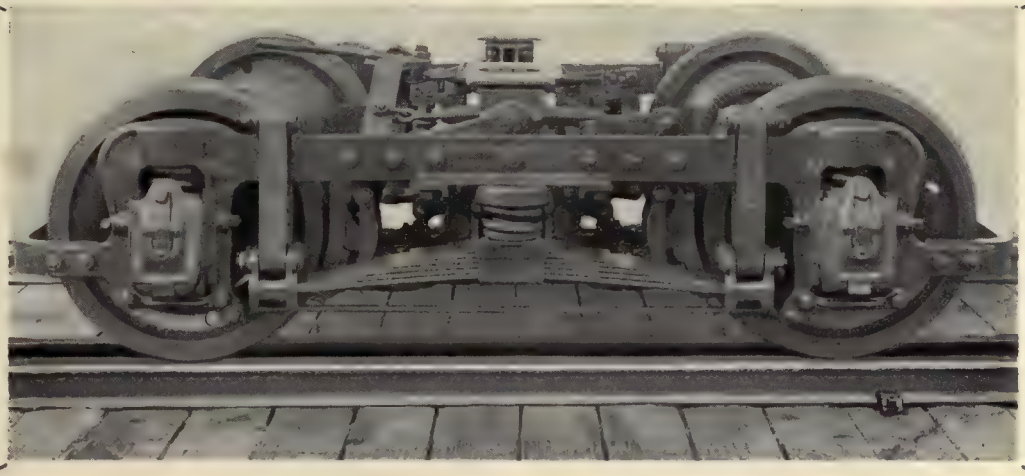
Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Star Brass Works
Westinghouse-Nuttall

Whistles, Air
Ohio Brass Co.
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Brill 177-E Trucks for Light Weight Cars

The Last Cost Shall Be First

In designing the Brill system of 177-E Trucks, it was the aim of Brill Engineers to construct a truck which could be guaranteed against breakage and excessive maintenance costs—to make the first cost as nearly inclusive as possible. That the goal has been reached is proven by the extraordinary success of this type truck. It is noted for its light weight, positive squareness and rigidity as well as its comfortable riding qualities.

The sideframes are specially designed and solid-forged. Wearing surfaces are protected by bushings and wear plates. Other patented Brill features such as the Half-ball Bolster Guide, Oil-retaining Center Bearing and Half-ball Brake Hangers contribute to the operating efficiency of this type truck.

Brill 177-E Trucks carry an unqualified guarantee against breakage except in case of collision or derailment. The last cost shall be first.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

Pacific Coast Representative: Rialto Bldg., San Francisco

To Electric Railway Executives

Two things you require..

1 The patronage and good will of your community

2 A profit

Timken Worm Drive Trucks will help you get business and hold it; by achieving maximum comfort for those who ride in your cars.

Timken Worm Drive Car Trucks will help you make a profit; by reducing car weight, economizing power, longer life of cars and rails.

TIMKEN *Worm Drive* AXLES

FOR ELECTRIC RAILWAY CARS

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

ANNUAL STATISTICAL AND PROGRESS NUMBER

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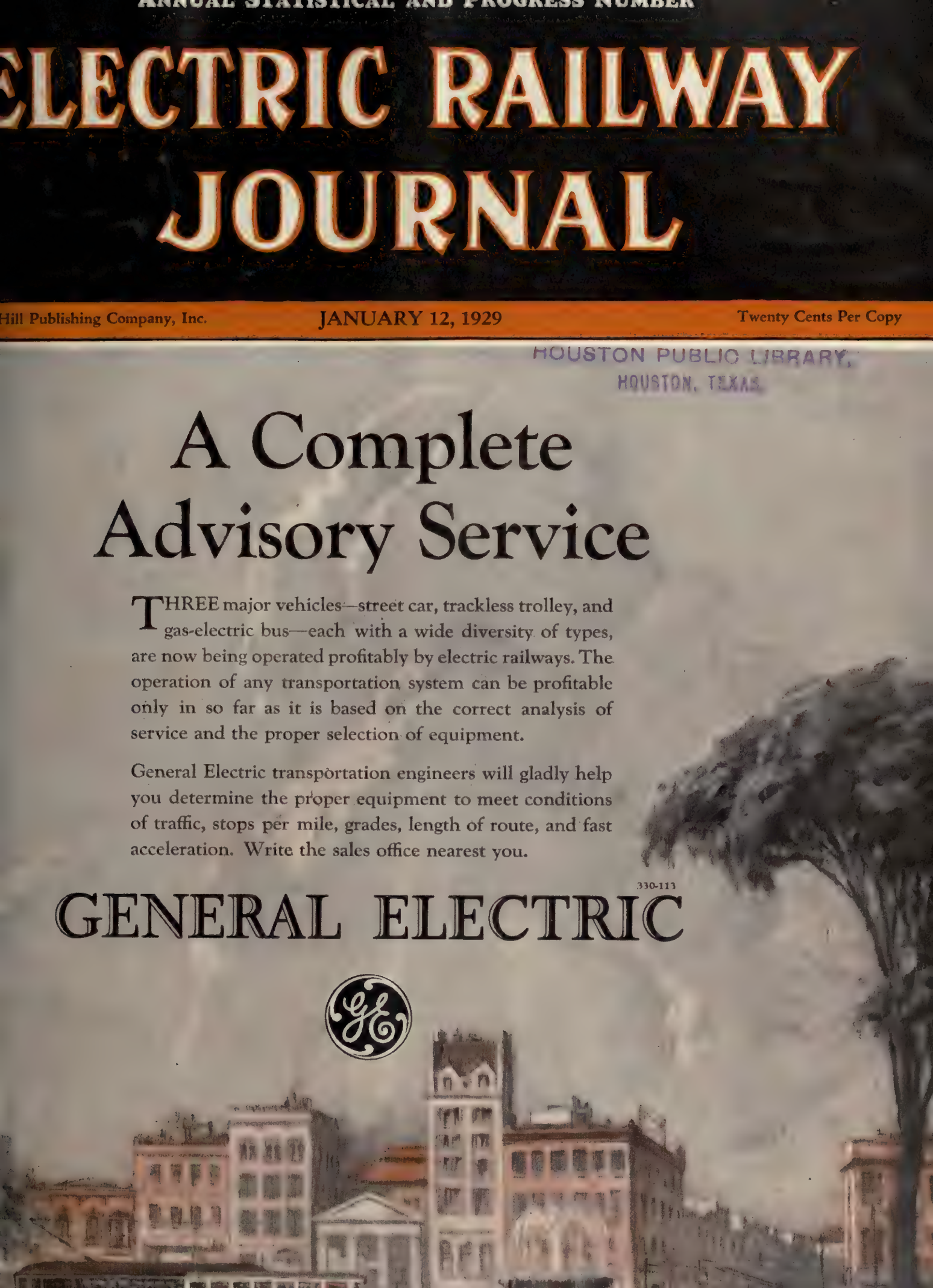
A Complete Advisory Service

THREE major vehicles—street car, trackless trolley, and gas-electric bus—each with a wide diversity of types, are now being operated profitably by electric railways. The operation of any transportation system can be profitable only in so far as it is based on the correct analysis of service and the proper selection of equipment.

General Electric transportation engineers will gladly help you determine the proper equipment to meet conditions of traffic, stops per mile, grades, length of route, and fast acceleration. Write the sales office nearest you.

330-113

GENERAL ELECTRIC





St. Louis Car Co. "Birney"



Versare Gas-Electric Coach



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Pittsburgh Railways

1928 Transportation Advances

1. De Luxe Super-powerful Birney Cars.
2. Perfection of the Electric Trolley Coach.
3. Further Application of High Speed Drives to Double-Truck Cars.
4. Luxurious Light-Weight Speedy Interurban Cars.
5. Fast Articulated Units for Surface Mass Transportation.
6. The Most Powerful Subway Car in the World.
7. Further Application of Electric Locomotives to Freight Haulage.

Westinghouse--ever looking forward--has contributed a major share in these developments, and pledges its continued support during 1929.



Osgood-Bradley 1929 Model



City of Detroit



Cincinnati Street Railway



Salt Lake City Electric Coach



Monongahela-West Penn Railway



Cincinnati, Hamilton & Dayton Railway



Pittsburgh Railways



Broad Street Subway, Philadelphia



Cleveland Railways

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Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse

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Electric Railway Journal

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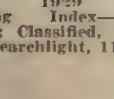
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1929
Advertising Index—Alphabetical, 119; Classified, 112, 114, 116; Searchlight, 110, 111

Vol. 73, No. 2 *Pages 41 to 106*

January 12, 1929

Annual Statistical and Progress Issue

HERALDING another year of progress, this number is devoted to the presentation of statistics and facts covering every phase of electric railway operation, based upon reports from properties owning more than 96 per cent of the track mileage in the United States and Canada. Expenditures, fares, wages, revenue, finance, trade conditions, track, cars, buses, rapid transit, heavy electric traction—no important factor is omitted. And to lend diversion to the issue, two features are presented—a nation-wide survey, from leading executives, on conditions in the territories served by their companies, and a mirthful news medley by G. J. MacMurray.

Editorial—Basic Improvements Accompany Another Year of Readjustment 41

Local Transportation Industry Proves Its Stability 43

Upward Trend Shown by Budget Figures 46

Electric Railway Executives Confident of the Future 50

Too Young for One Generation; Too Old for the Other 56
By G. J. MACMURRAY

Track Construction Greater 63

Notable Progress in Heavy Electric Traction 67

Subway Mileage Increasing 70

Substantial Growth in Bus Operations 71

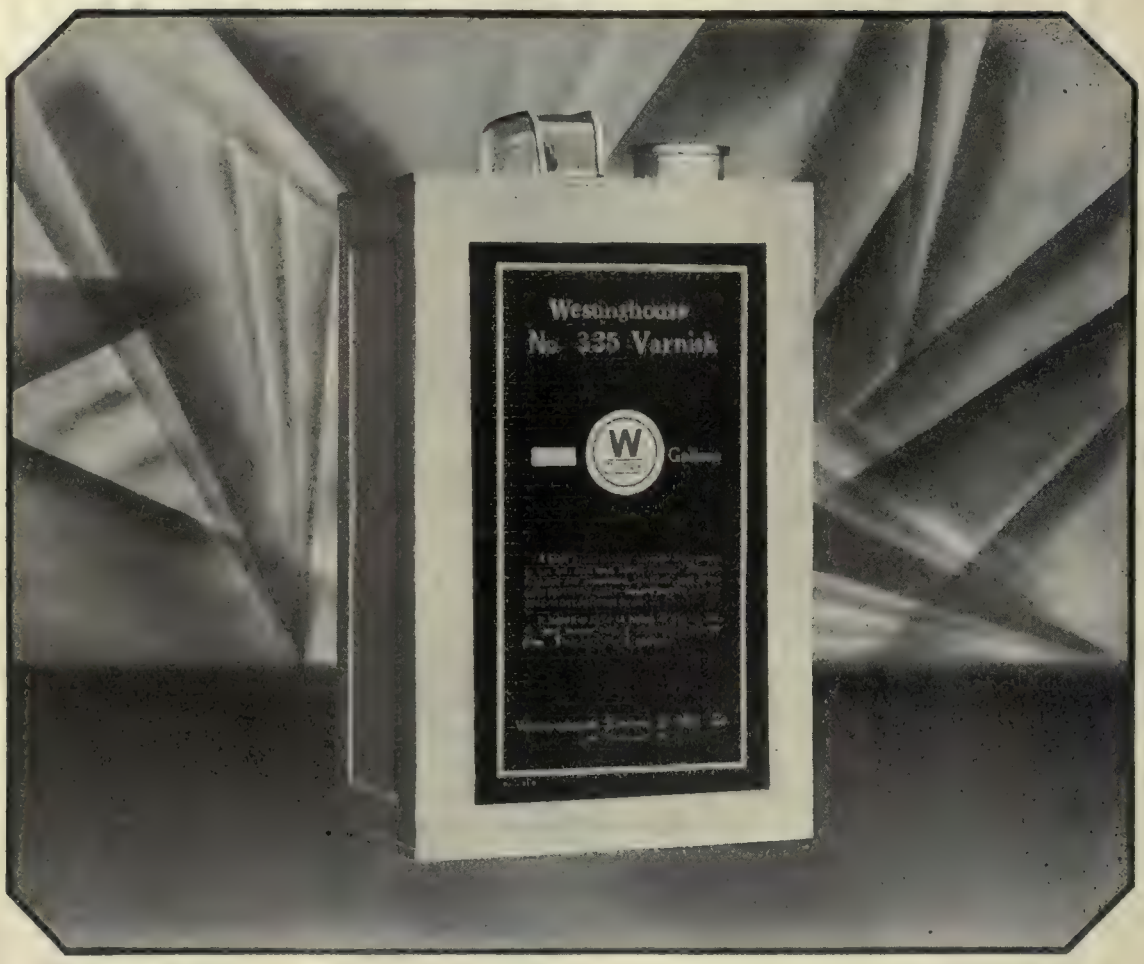
Passenger Car Purchases in 1928 at Low Level 78

Financial Status Improved Materially 85

Electric Railway Fares and Wages in 1928 at Highest Point 91
By ALBERT S. RICHEY

Trade Prospects Favorable for the New Year 94

News of the Industry 97



Varnish Revives Motor Insulation

WESTINGHOUSE Varnish No. 335 renews old and dried-out railway motor insulation. This varnish seals insulation that has become cracked and charred from the severe service to which railway motors are subjected; it keeps out moisture and oil, tightens the coils in the slots, and renovates all insulating materials on the motor armatures. Therefore, Varnish No. 335 is more than a save-the-surface varnish—it is an insulating varnish. In many railway shops where Westinghouse varnish is being used, motor failures have been reduced more than 50 per cent.

Other Westinghouse insulating materials for railway service include treated and untreated fabrics, tapes, and papers; Micarta sheets, tubes, and formed shapes; mica, and insulating compounds and oils.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries

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MEMBER AERA 1929

Westinghouse

BETTER RAIL, BETTER TRANSPORTATION

Fight 1929 automobiles with 1890 cars?

Or 1909 cars? You don't! But do your 1928 cars give you the service for which you paid?

Not unless they run on good track — free from corrugations, free from low joints, battered special work or squeal-dry curves.

To make new cars act their age and keep old ones from acting theirs—use the equipment here displayed for your inspection.

Complete details on the complete line —get them

Railway Track-work Co.

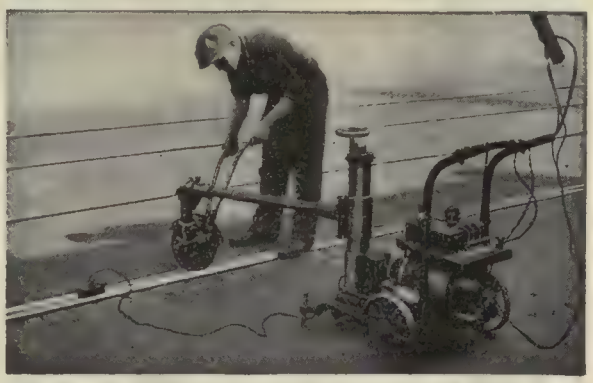
3132-48 East Thompson Street, Philadelphia

AGENTS

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Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
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P. W. Wood Railway Supply Co., New Orleans, La.
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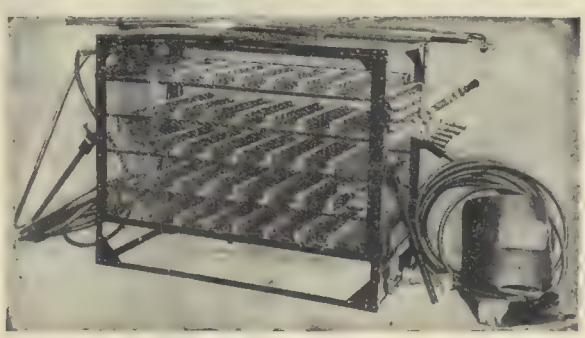
3180







Reciprocating Track Grinder



"Ajax" Electric Arc Welder

BETTER RAIL, BETTER TRANSPORTATION

Why Have These Materials a Service Edge?

WORLD-WIDE recognition comes only to the institution which renders an unusual service; which shows by its foresight a thorough understanding of the demands that will be made upon its products, and delivers in these products a full measure of service ability.

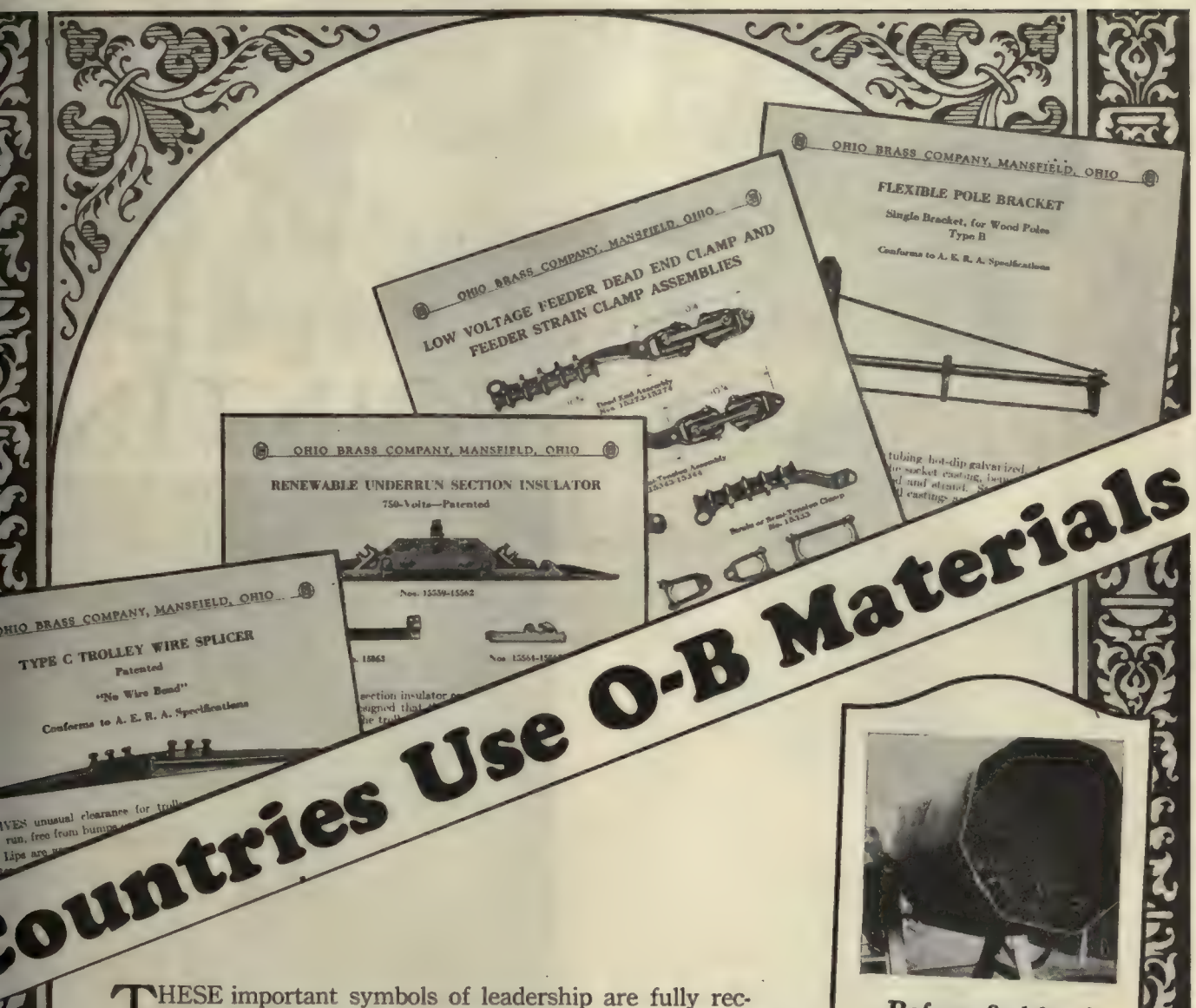


Over 650 Properties in 2

DOLLAR AND SENSE INVESTMENTS

The O-B overhead materials you use are all sound "Dollar and Sense Investments", because each is designed and manufactured to render a more efficient service, to last longer and to reduce costs of installation and maintenance.





Countries Use O-B Materials

THESE important symbols of leadership are fully recognized by O-B. The necessity for correctness of design; for only materials of proven worth; for strictest supervision to insure absolute uniformity, are inherent in the O-B organization.

Nor is that all. O-B engineers travel thousands upon thousands of miles; visit properties the country over each year, constantly observing the performance—the service ability of O-B overhead materials. These men daily contact the operating engineers of the electric railway industry. From these contacts come new ideas; suggestions for new or improved designs; ways and means for bettering present O-B materials.

Thus O-B maintains leadership; and the buying habits of the electric railway industry indicate its recognition of the "service edge" to be found in O-B overhead materials.

Before & After!

THEN: One man; 9 hours; 5,000 two-inch valve hand wheels painted.

Now: One man; a tumbling barrel; predetermined quantities of paint; 22,500 wheels painted per 9-hr. day.

Unmistakable evidence that the O-B Technical Dept. has been on the job. Another reason why O-B finds it possible to plus its products to customers by refinements such as heat-treated (Flecto) malleable iron; brighter, thicker galvanizing; pyrometric brass melting control; refinements which many manufacturers do not afford.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1013L

Ohio Brass Co.

NEW YORK CHICAGO PHILADELPHIA PITTSBURGH ATLANTA CLEVELAND SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES



WASHINGTON

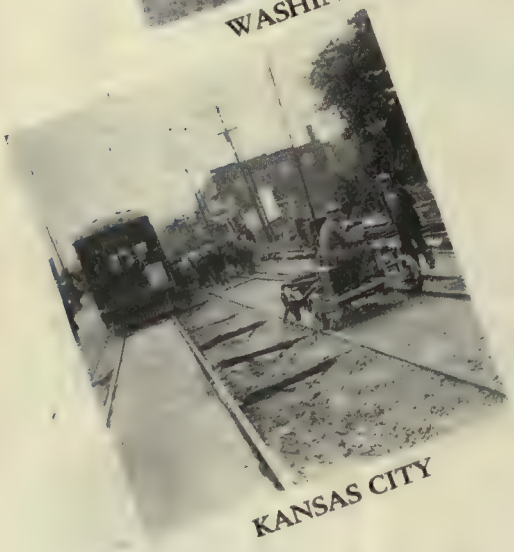


ATLANTA



PHILADELPHIA

POINTING



KANSAS CITY





SALT LAKE CITY

THE tendency of all the larger properties t use Steel Twin Ties is more apparent every year. In 1928 more Steel Twin Ties were laid than i

THE INTERNATIONAL

CLEVELAND,

STEEL TWIN

THE BASE OF

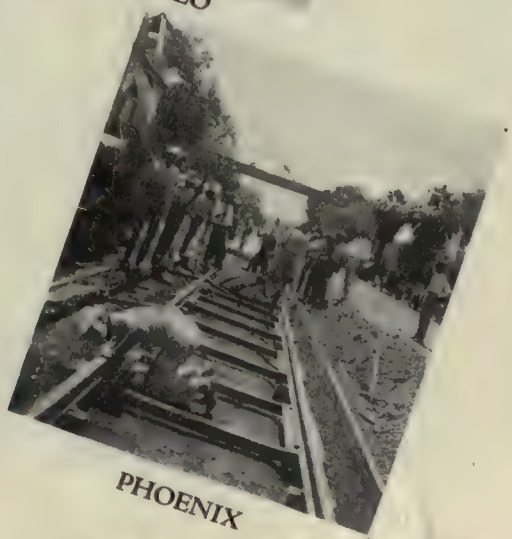


NEWARK DETROIT BUFFALO

THE WAY!



y previous year. The chart above shows the grow-
g trend of the industry toward the acceptance of
eel Twin Ties and mass production methods.



PHOENIX

Introduc-
tion of
mass pro-
duction
methods



SAN DIEGO

TEEL TIE CO.
HIO, U. S. A.

TIE TRACK

MODERNIZATION



They enter smiling!

THOSE who ride in buses equipped with the Westinghouse Air Brake are assured of a safe ride and quick transit.

This brake provides adequate control—without driver fatigue—to properly safeguard the operation of large capacity buses. It permits the making of short, smooth stops, that are reflected in a more prompt service.

Your patrons are interested in improved equipment details, and react favorably toward vehicles that provide better transportation.

Westinghouse Air Braked coaches —and there are many of them— have the potentiality for doing this.

WESTINGHOUSE TRACTION BRAKE CO.
Automotive Brake Division, Wilmerding, Pa.

6238

WESTINGHOUSE
AUTOMOTIVE AIR BRAKES

Bus Achievements for 1928

★ TRANSCONTINENTAL HAULS

★ STREET CAR CAPACITY

★ DUAL POWER PLANTS

★ REPLACEMENT DOUBLE DECKS

★ CO-ORDINATED AIR *and* COACH TRAVEL

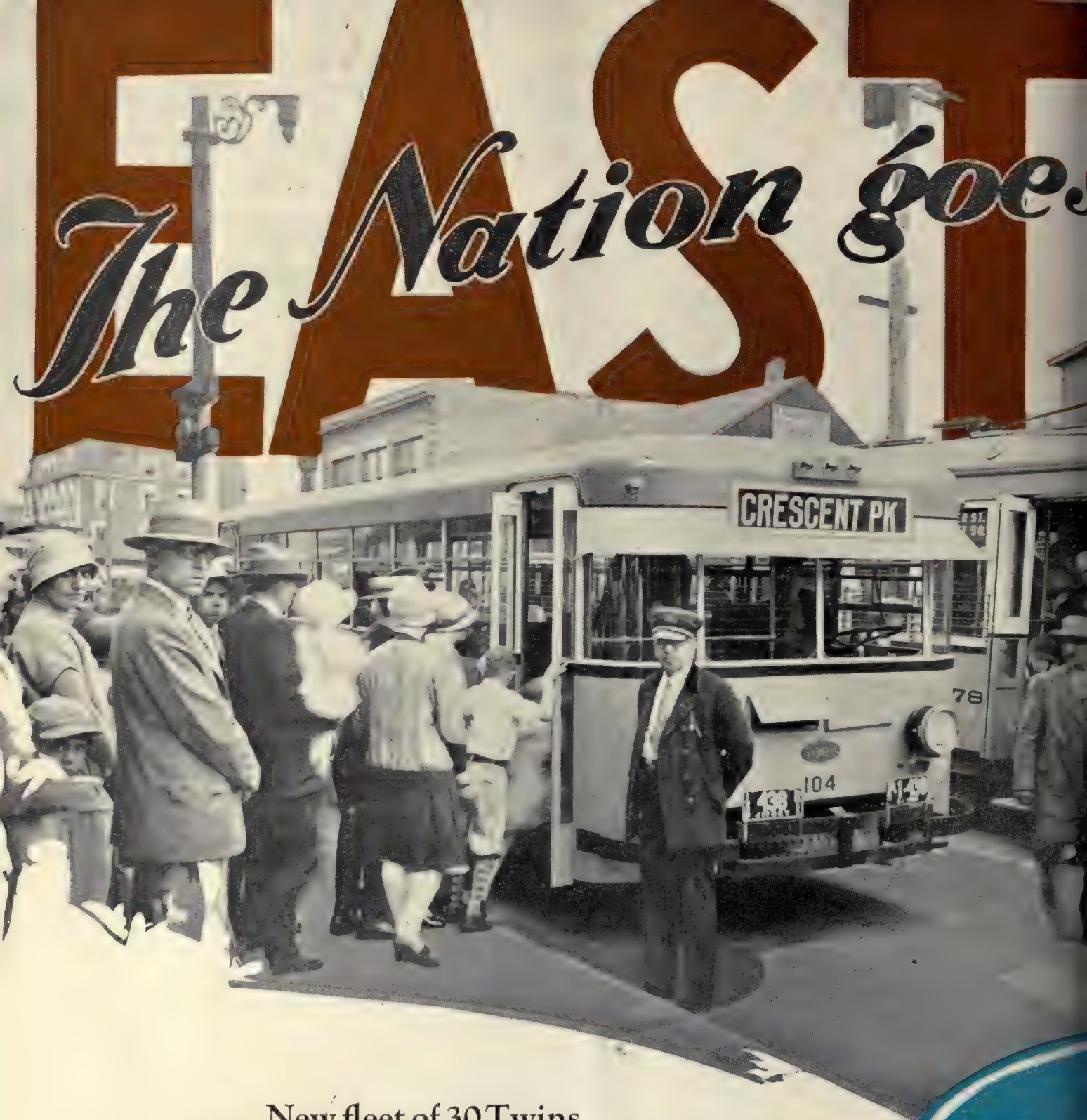
★ SLEEPER COACHES

★

TWIN COACHES

FAST

The Nation goes



New fleet of 30 Twins
purchased by United
Electric Railway,
Providence, R. I.

Tw

50 TWIN COACHES BOUGHT BUILT

WEST

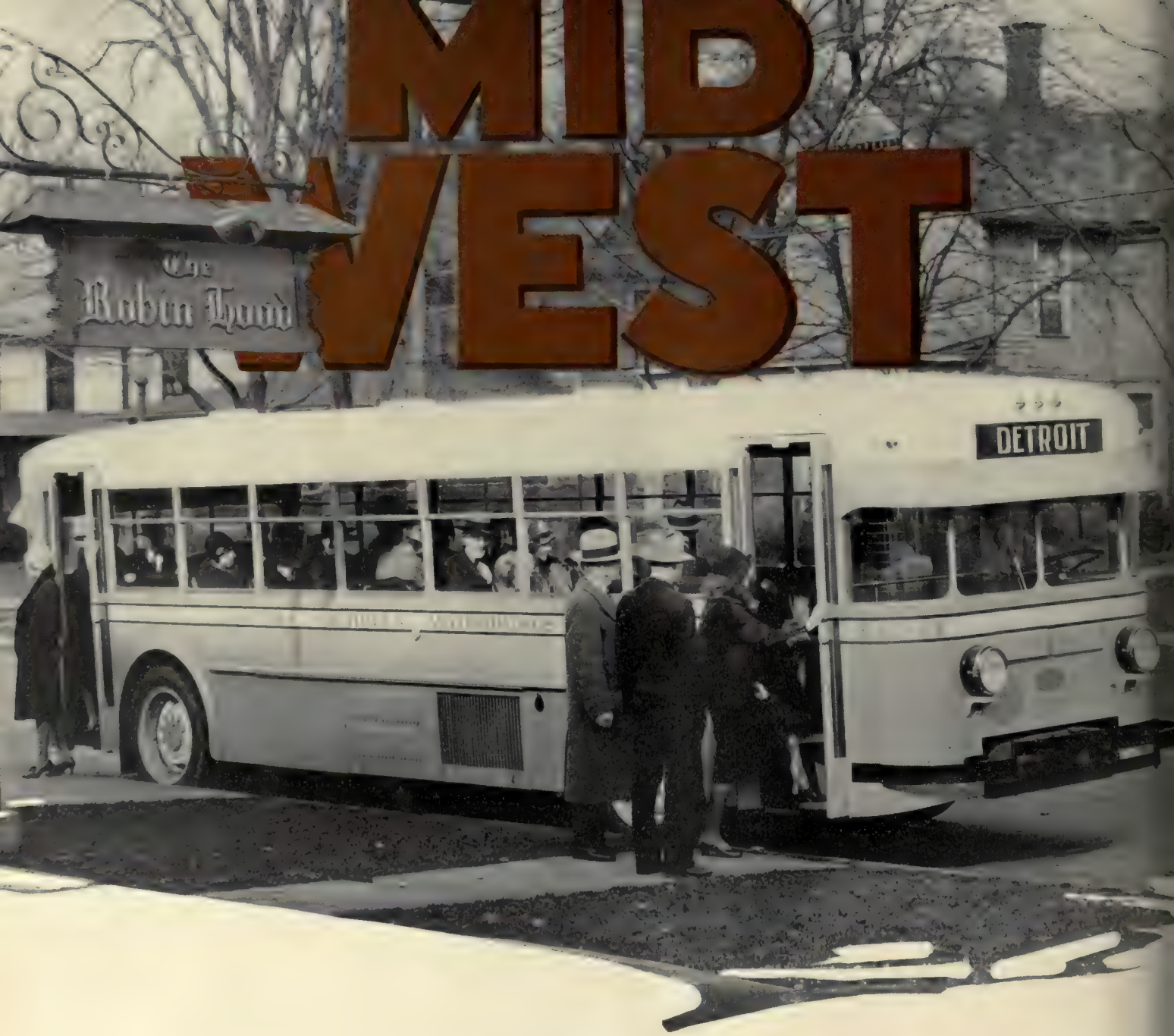
Twin Coach



New fleet of 40 Twins purchased by Key System, Oakland, California

ach
KENT, OHIO

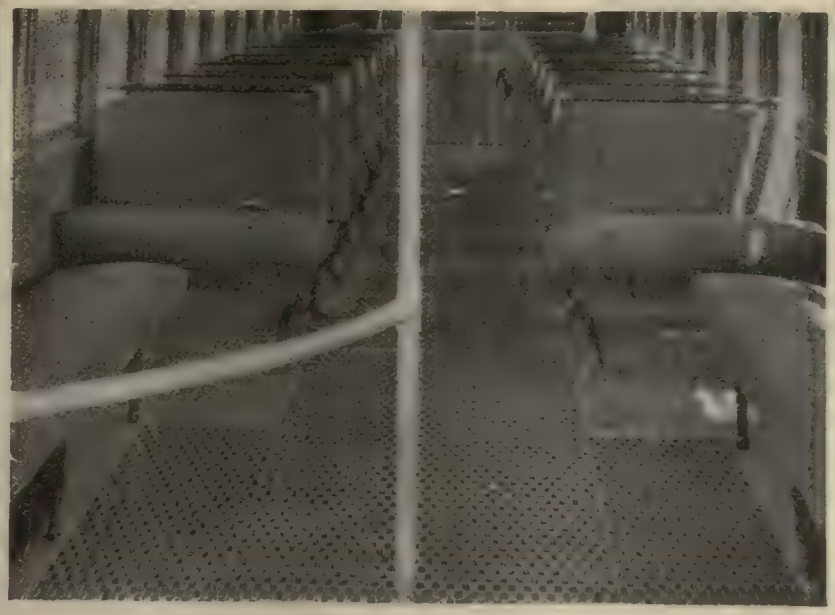
DELIVERED IN 100 DAYS



40 *Twins*

bought, built and delivered
in one month to

DETROIT MOTOR BUS CO.
EASTERN MICHIGAN MOTOR BUSES
DETROIT MUNICIPAL RAILWAY



WEAR-PROOF

for 5 YEARS OF HARD SERVICE

Wear-Proof Mats are guaranteed to survive the wear of thousands of feet in all kinds of weather, for 5 years.

1. They are flexible, can be rolled up like a rug and will not warp or turn up at the edges.

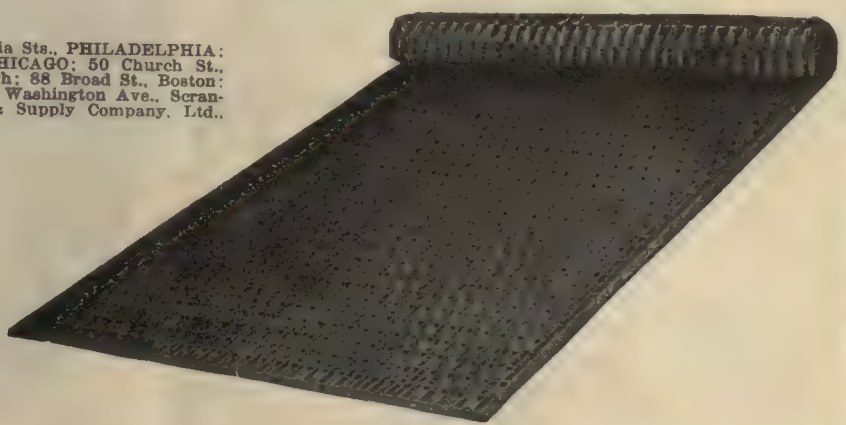
2. They may be used on both sides.

3. The slip-proof construction minimizes the danger of accidents to passengers as they furnish a secure footing in both wet and dry weather.

Besides its practical features, the Wear-Proof Mat greatly enhances the appearance of the car.

You can order it in any rectangular shape and in one or more pieces as required. Standardize on Wear-Proof. It takes mat troubles off your mind for 5 years.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District office at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.



ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



Justly Known as "One-Wear"

THE term "One-Wear" wheel implies the possession of certain qualities. Qualities of wear resistance, strength and lightness that are supplied only by a special composition, heat-treated steel.

The evidence of more than a half million wheels now in service brings the verdict from the court of railroad opinion that Davis "One-Wear" Steel Wheels are truly "One-Wear." It's the special steel that makes them so.



AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Year in ~ Year out

TREADLE-IZATION



NP

During **1928** many leading electric railways have solved the problem of handling heavy traffic without blocking and congestion by boarding and alighting passengers.

1929, too, will witness many more adopting this same modern means of handling passengers,—this new method of door and step control called—

TREADLE-IZATION

NATIONAL PNEUMATIC COMPANY

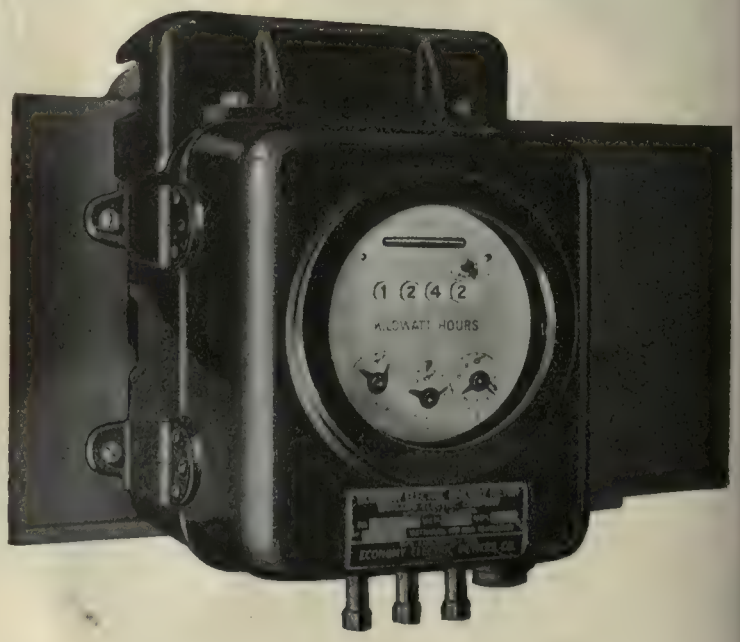
Install Economy

Economy Electric Railway Meters

Electric Railways in over 200 cities have cut the consumption of energy 10 to 20% through the use of Economy Railway Watthour Meters.

Because the operators are continually stimulated toward correct car operation—The Economy Meter is a welcome tool which assists each man to improve by giving him a measure of his operating efficiency.

Economy Meters are easily installed and simple to maintain. Mercury-cushioned rotating parts insure their accuracy under railway and bus operation.



Besides Saving Your Power

the Economy Inspection Dials provide a method which accurately and automatically shows when car inspection is needed. They also show at a glance how much work a car can do before inspection is needed, and in case of a road failure, how much work the car has done previous to the failure. All this without any clerical labor.

LECTRIC / GASOLINE Meters

—the first step to Saving

Economy Gasoline Vehicle Meters

ll the same need in motor transportation that he Electric Meter does in electric transportation.

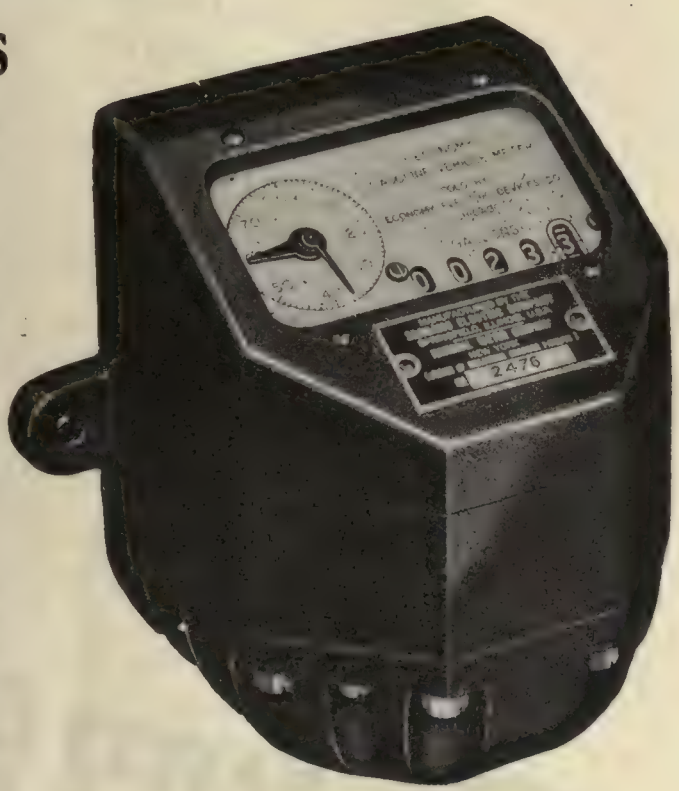
They give an accurate record of energy costs.

Energy for automotive equipment is measured n gallons of fuel per mile. Hence the need for n accurate device for recording fuel as it is used.

The meter is designed for mounting on the dash r on a bracket and is easily connected in the uel line between the supply tank and the vacum tank.

The amount of fuel used is recorded in gallons nd tenths of gallons. From these records the anagement can determine whether waste is due faulty driving or poor condition of equipment.

You will begin to see a real saving in gasoline hen you meter it *as used.*



Economy Electric Devices Company

37 W. Van Buren St., Chicago

Cable Address: Sangamo, Chicago

General Sales Agents
Sangamo Economy Watthour Meters
Economy Gasoline Vehicle Meters

Haskelite and Plymetl

District Agents for
Peter Smith Heaters
Lang Bus Bodies

METER THE ENERGY—THAT'S WHAT YOU WANT TO SAVE



Common—yet not Commonplace

The Safety Car Control Equipment . . . which interlocks power, brakes, and door control to provide maximum safety and convenience for cars operated by one man . . . is now universally used by traction properties.

To street railway men this equipment is familiar, yet not devoid of interest. It still attracts attention by virtue of its contribution to safe, speedy, and economical transportation. Its potentiality for improvement in service and public goodwill is being recognized more extensively from year to year.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

STATISTICS!

Operators who keep

statistics

always reorder from

The

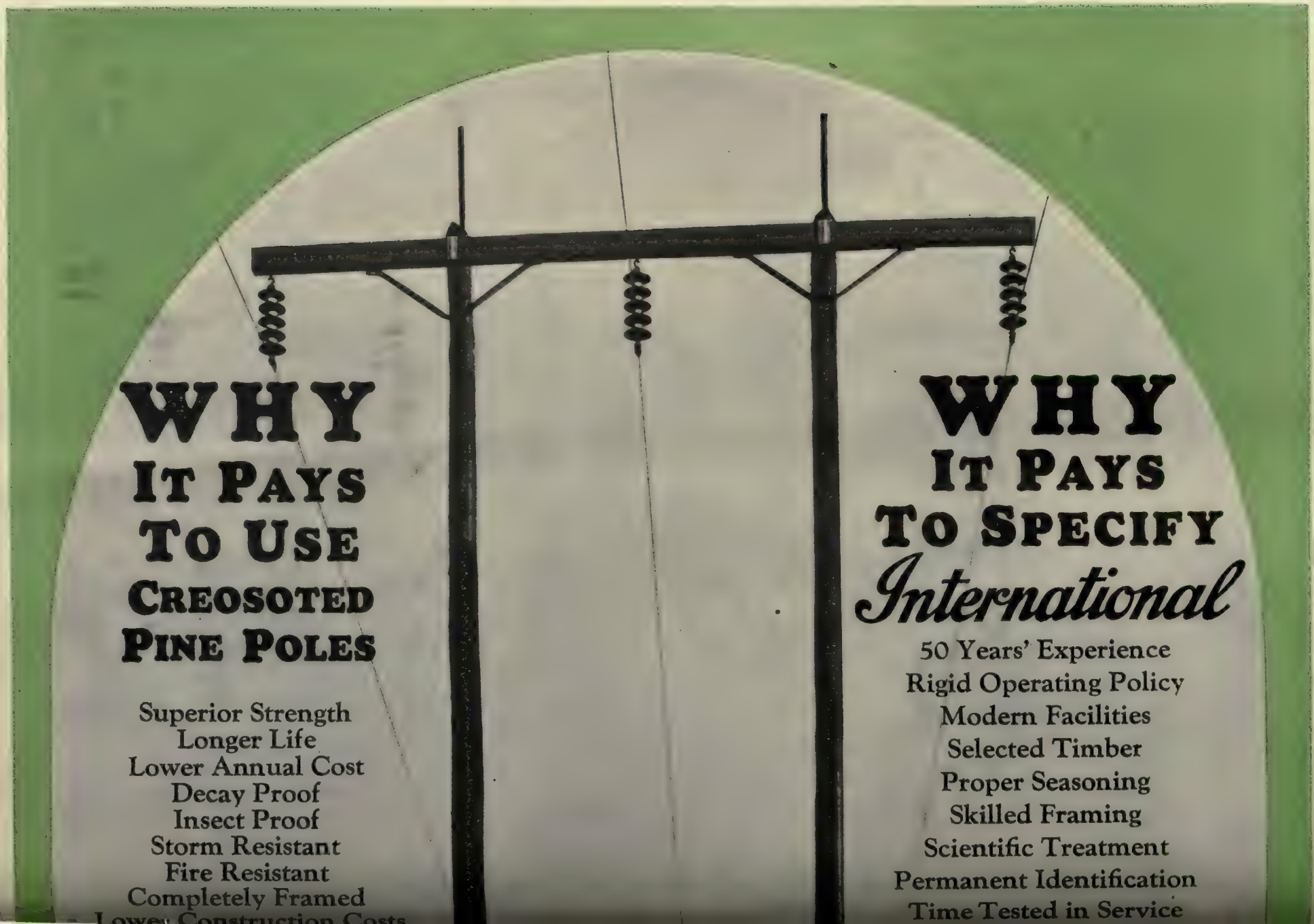
CINCINNATI CAR CORPORATION

Successors to

Cincinnati Car Co. and Versare Corp.

Winton Place

CINCINNATI, OHIO


WHY
IT PAYS
TO USE
CREOSOTED
PINE POLES
Superior Strength
Longer Life
Lower Annual Cost
Decay Proof
Insect Proof
Storm Resistant
Fire Resistant
Completely Framed
WHY
IT PAYS
TO SPECIFY
International
50 Years' Experience
Rigid Operating Policy
Modern Facilities
Selected Timber
Proper Seasoning
Skilled Framing
Scientific Treatment
Permanent Identification
Time Tested in Service


International Creosoted Pine Poles between Bloomington and Bloomfield, Indiana, in service of the Interstate Public Service Company. "H" Construction — average span 600 feet, carries 66,000 volt line.
A LARGE supply of poles ready for "Ship today" service is carried in stock. Specially framed and extra long poles can be obtained on short notice.
International Creosoting & Construction Co.
General Office: Galveston, Texas
Plants: Texarkana-Beaumont-Galveston.
2C9
The International Dating Nail
Distributed by GraybaR ELECTRIC COMPANY
International
Creosoted Yellow Pine Poles



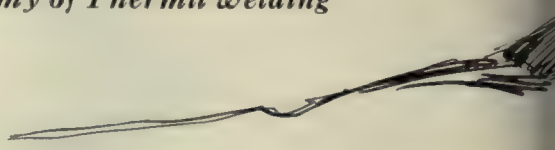
Another Record *for* THERMIT WELDING

More electric railways used Thermit in 1928 than ever before. Perhaps you are one of them. It is a 2-to-1 chance that you are.

And another interesting point is that these companies consumed a record breaking quantity of Thermit. In fact, the increase for 1928 over 1927 was in itself as large as the total consumption of Thermit for 1919 and 1921 combined.

This gain is due not only to the greater use of Thermit on new track extensions and on rebuilt track, but also to its wider application in repairing joints to extend the life of track for many years to come.

It is indeed a tribute to the increasing popularity and economy of Thermit welding



METAL & THERMIT
PITTSBURGH CHICAGO BOSTON 120 BROADWAY,



CORPORATION

EW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO



Longer Mile

EXPERIENCED bus operators have proved over millions of miles of bus operation that Koolmotor Bus Oils effect a vital dollar and cents reduction in maintenance costs. That is why many of the largest motor transportation systems in the country use Koolmotor Bus Oils exclusively.

Koolmotor Bus Oils, backed by our specialized Bus Lubricating Service, accomplish these definite results—

- Greatly prolong the useful life of parts subject to wear.
- Extend the periods between scheduled replacements and inspections.
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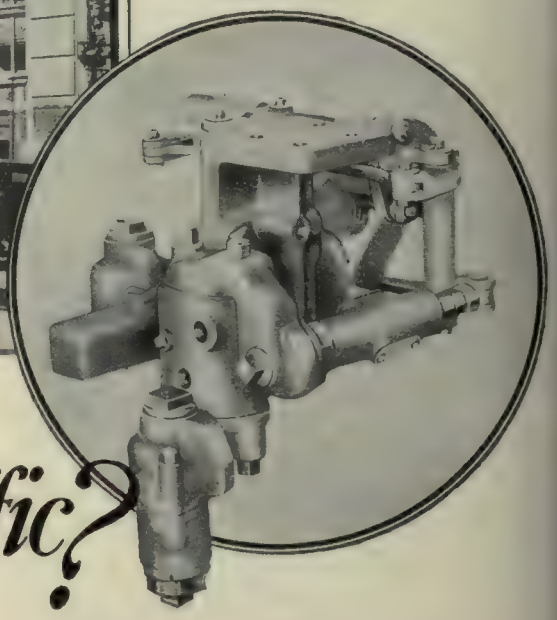


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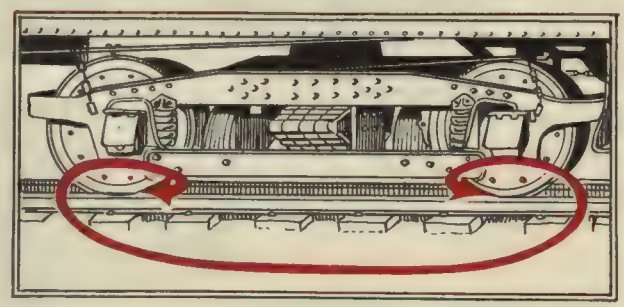


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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
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CHARLES GORDON, *Editor*

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Basic Improvements Accompany Another Year of Readjustment

FATHER TIME has closed his books for 1928. His journal of daily events in the local transportation industry has now become history. Successes and failures alike are indelibly recorded. It is wise, therefore, at the beginning of the new year to examine the footings carefully; to note well the gains and losses. And it is even more important to determine the causes behind the actual record so that those who are responsible for policies may profit from the experiences of the year.

This entire issue of *Electric Railway Journal* is devoted to the factual record. Figures of extensions of track and reconstruction work exceed those of last year, which were higher than for any year during which these statistics have been collected. This is convincing evidence of increasing confidence in the future of public transportation on rails. At the same time, bus purchases for 1928 exceeded the 1927 figure by an appreciable margin. This, combined with the fact that more unprofitable track mileage was abandoned than for any other single year, indicates that transportation companies are gradually cleaning house and are utilizing the bus freely where it offers advantages over rail service. On the other hand, purchases of new cars were at the lowest ebb in the history of the industry. This is no indication of lack of attention to the importance of replacing obsolete equipment, or lack of interest in the possibilities of new cars. Nor is it, in the last analysis, attributable to lack of buying power on the part of the railways. The money spent for track construction and for bus purchases is definite refutation of that assumption. There remains, therefore, only the conclusion that the types of cars offered by the builders have not offered assurance of their superiority over existing equipment in attracting riders, sufficient to convince the man that is responsible for putting up the money. There are strong indications, however, that the slump in car buying has run its course. Reports from operating companies indicate definite plans in 1929 budgets for car purchases that promise to exceed the figures for the past several years. There is little question but that equipment replacement may be expected to proceed at an increasing rate during the next several years.

THE level of street railway fares continues to move upward, and it is now quite apparent that the public is willing to grant equitable rates when management offers reasonable evidence of good faith in improving facilities and service. Accompanying the rise in the average rate of fare has been a distinct improvement in public relations throughout the country. The modern policy of frank and open discussion of railway problems and of the education of trainmen to a better understanding of the business of which they are a part is proving its wisdom. All of this is likewise being reflected in the liberalization of franchise terms on the part of the public, and in recognition on the part of operating companies that their right to the use of the public streets and the future security of their business are based more upon the value of the service which they render the public than upon the terms of a specific franchise. Transportation men have come to realize that a franchise to lose money is worth very little.

Financial housecleaning is accompanying the physical rehabilitation of local transportation. The flood of receiverships during the industry's most severe period of stress following the war has receded steadily, and there has been a gradual reduction, through reorganization, in the amount of bonds in default. During 1928 the railway mileage which went into receivership was the lowest in the entire period during which the *Journal* has been compiling this record.

Thus, in perspective, there has been a material improvement in basic conditions. There has been substantial progress toward meeting the changed

conditions with which the industry has been faced for a number of years. It is probable that in the future, we shall find that the actual corner was turned several years ago, and that the industry moved ahead much faster in 1928 than was apparent to those close to the firing line of daily operations. Perhaps the most significant fact gleaned from the record of the past year, as it has stood out for almost a decade, is the immense vitality of the public transportation business. Carried along by an amazing momentum, the manufacture and sale of automobiles has established new records, and a new flood of rubber-tired vehicles has been turned loose on the streets of American cities. There seems to be no limit to the ingenuity of those who design these cars to devise new features of style and to improve performance, and the public has amply demonstrated its willingness to pay for these improvements. But despite all of this the need for organized public transportation shows no diminution. Though the registration of automobiles has risen to unprecedented levels, their use for daily transportation remains economically and physically impracticable.

ONLY a few years ago, credulity would have been strained to predict that physical saturation of street capacity would become the limiting factor in automobile usage, but that, nevertheless, has become a fact in every large city and in many smaller ones as well. Traffic congestion has assumed major proportions as a community problem. It threatens to defeat the very forces which have brought the modern city into our social and economic life; namely, convenience and economy of business and social intercourse. The inconvenience, cost and delays caused by congestion threaten to overbalance the advantages of the compact community.

Grandiose schemes are being brought forth with recurring frequency for the construction of double-deck streets or other major street improvements at public expense for the accommodation of individual vehicles. Only recently has American business begun seriously to consider the relative economic importance of the organized public transportation agency and the private vehicle. Only recently has the relative efficiency of the public and the private vehicle in the use of street space become apparent. Even today, the general public does not understand that money expended for the construction of one 4-track rapid transit line, either subway or elevated, will provide accommodations for as many people in the rush hour as will 25 express boulevards for private vehicles. Nor is business and industry, in the face of this fact, giving the serious attention which its importance warrants, to the question of whether or not American communities can afford to assume the overhead costs of encouraging the further use of individual automobiles by major street construction programs. Undoubtedly there is a limit to the overhead cost which can be imposed upon the modern city, without unbalancing the very economic forces that have caused its development and growth.

DURING the past year, public transportation men have begun to play a more important part in the study of these fundamental phases of the transportation problem in their relation to community development. At the same time, they have given increased attention to the underlying economic factors in their own business. The effect of load factor on the costs of providing transportation service has received serious consideration as have also the influences which affect the load factor through their bearing on off-peak riding. Throughout the industry, there is agreement that the wide fluctuation between rush hour and non-rush hour business is a major element in the cost of providing service. But in only a few cities has there been any appreciable progress in building up off-peak volume. Where this has been done, the success achieved has been attributed to greater speed, to scientific scheduling with the objective of having a car always in sight, and to persistent and consistent ride selling through intelligent publicity and properly trained employees. Relatively little has been done in developing a scientific basis of rates proportioned to the cost of the service furnished to various classes of riders, as a means of building up off-peak business. But greater attention has been directed to this important subject than at any other time for a number of years.

THE industry is, of course, still a long way from being established on a really profitable basis—a basis that will insure the free flow of needed new capital to keep pace with public requirements. In practically every large city transportation facilities lag behind the requirements of the community because of the difficulty in attracting new capital to a business which still does not show a satisfactory balance sheet. In the smaller communities the volume of riding is not satisfactory. It is apparent that improved equipment and service, combined with a more scientific schedule of fares, offer the greatest promise of building up revenues to a profitable level. The industry is still far from the position of having exhausted its possibilities. But in the very progress that has been made since post-war days lies the greatest assurance that local transportation men have the energy and the enthusiasm to carry public transportation forward as an agency vital in the upbuilding of American communities.

Local Transportation Industry Proves Its Stability

Despite rising flood of competition from automobiles only slight changes are evidenced in general traffic figures of electric railways

INHERENT stability is the most significant factor which stands out from an examination of operating statistics of the local transportation industry for the year 1928. Despite unprecedented production and sales records for automobiles, amounting to more than 4,000,000 passenger cars in the United States and Canada, the number of riders on public transportation vehicles operated by electric railways remains practically constant. As the use of buses by electric railways to supplement existing lines has gradually led to the cleaning out of unprofitable rail mileage, the number of passengers carried by electric cars shows a slight recession, while the number of passengers handled by buses shows a corresponding increase. But these changes represent at most merely minor adjustments in character of service. Far surpassing them in significance is the fact that local public transportation agencies are holding their own in the face of unprecedented increases in the number of private automobiles in the hands of the public. When it is considered that there are now over 21,500,000 private automobiles registered in the United States and that approximately $1,500,000,000 was spent in 1928 for highway improvements to provide them a place to operate, the results achieved by the local transportation industry in the face of this almost overwhelming competition stand out in full relief.

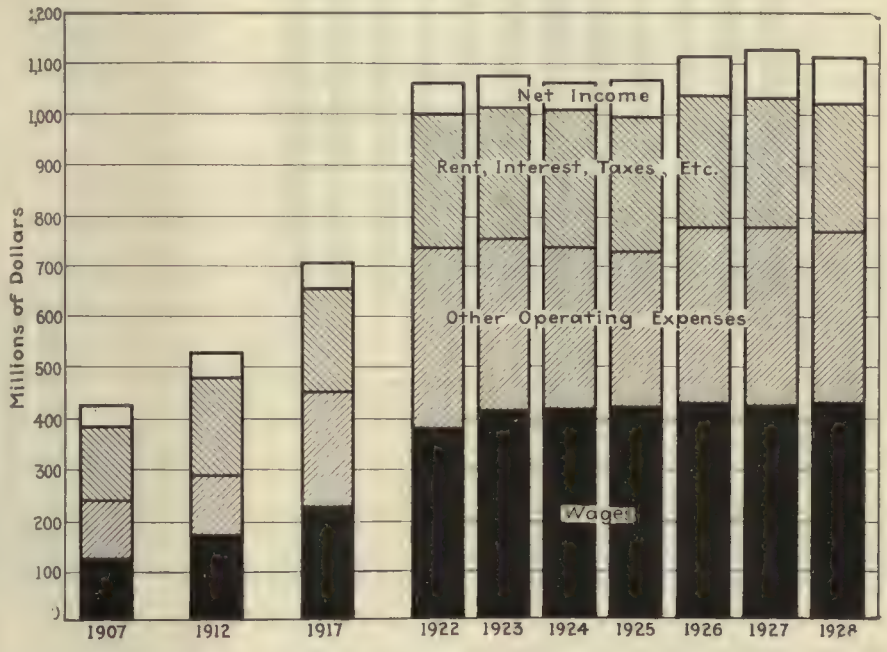


Chart 1—Distribution of revenues of electric railways of the United States compiled from U. S. Census figures for 1907, 1912, 1917 and 1922 and from data collected and prepared by American Electric Railway Association for intervening years

Comparisons of the figures from one year to another are of little value in analyzing the economic status of electric railways. For that reason, accompanying charts prepared with the co-operation of the statistical department of the American Electric Railway Association and based upon available census figures supplemented by those collected by the association, are presented to give an adequate perspective of the basic economic trends. In Chart No. 1 are shown the revenues from all sources for the census years 1907, 1912, 1917 and 1922, and for each year from 1923 to 1928 inclusive, based upon A.E.R.A. compilations. The chart is arranged to show the division of revenue for these years between wages, other operating expenses, rent, interest and taxes, and net income. It is worthy of note that since 1922 there has been little change in the general trend of total revenue or of any of the principal divisions of the chart. The trends have all been gradually upward, with net income remaining about constant. The period from 1922 to 1928 witnessed the active introduction of the bus by local transportation companies. The figures for 1928 show little variation from the general trend since 1922. The approximate totals for this latest year are as follows: revenue from all sources, $1,110,000,000; wages, $430,000,000; other operating expenses, $338,000,000; rent, interest, taxes, etc., $264,000,000; net income $78,000,000. Wages represent approximately 38.7 per cent of the total revenue; other operating expenses 30.5 per cent; rent, interest, taxes, etc. 23.8 per cent; and net income 7 per cent.

Examination of the specific figures for passenger traffic on local public transportation vehicles further emphasizes the status of organized community transportation as a basic necessity. In Chart No. 2 there is shown the total number of passengers carried by electric railways in the United States, for the years from 1917 to 1928 inclusive, the figures for the census years 1917 and 1922 being those compiled by the census bureau

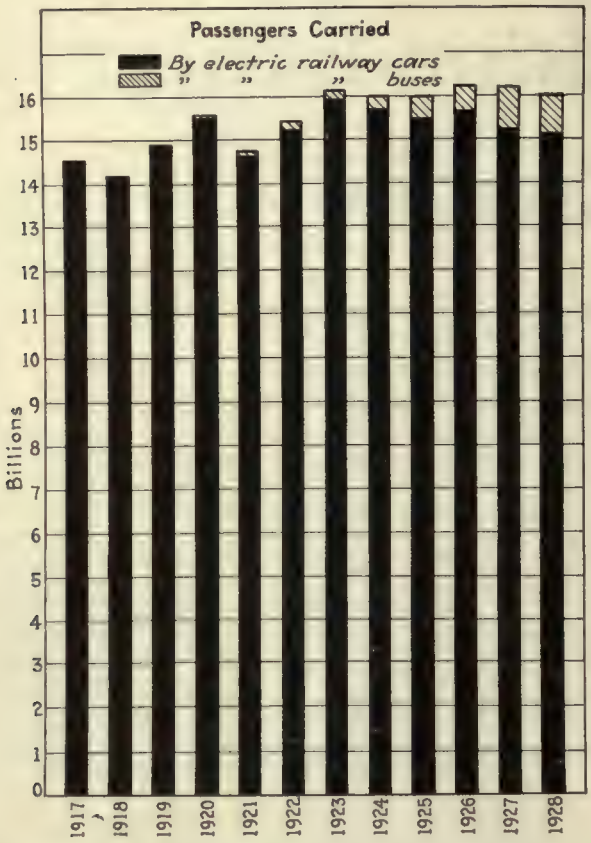


Chart 2—Total passengers carried on electric railways and their bus subsidiaries in the United States. Compiled from U. S. Census figures for 1917 and 1922 and from A.E.R.A. data for remaining years

and those for intervening and succeeding years being based upon estimates compiled by the American Electric Railway Association. The totals are divided each year to show passengers carried on electric railway cars as well as those carried on buses operated by electric railway companies or their subsidiaries.

During 1922, the last census year for which complete figures are available, the total revenue passengers carried amounted to 15,361,402,000. Of these, 15,331,402,000 were carried on cars and 30,000,000 on buses. As the use of buses has been extended by electric railways, there has been a consistent increase in the number of buses operated, in the annual bus mileage operated by electric railways and in the number of passengers carried by bus. It is interesting likewise to note that there has also been a steady increase in the average mileage per year per bus owned, and in the number of passengers carried per bus, indicating more intensive use of bus equipment. For the purposes of this analysis, however, the important fact is that neither the increased use of buses nor the enormous increases in the registration of private automobiles has materially reduced the number of passengers who depend upon electric railways for their daily transportation. In 1923 the peak of car passengers was reached with a figure of 15,989,000,000, or an increase of approximately 4.3 per cent over 1922. In 1924 car passengers were 2.4 per cent above 1922; in 1925, 1.1 per cent above 1922; in 1926, 1.9 per cent above 1922; in 1927 practically equal to 1922; and for 1928, 1.8 per cent below 1922. During this period the number of passengers carried on electric railway buses increased from approximately 30,000,000 in 1922 to approximately 900,000,000 in 1928. Adding these bus passengers to car passengers the total for 1923 is 4.6 per cent above 1922; 1924, 3.5 per cent above 1922; 1925, 3.3 per cent above 1922; 1926, 5.4 per cent above 1922; 1927, 4.9 per cent above 1922; and 1928, 3.8 per cent above 1922. Thus, although automobile registrations increased during this period from 10,864,128 in 1922 to 21,630,000 in 1928, or practically 100 per cent, public transportation agencies held their own in the number of passengers carried.

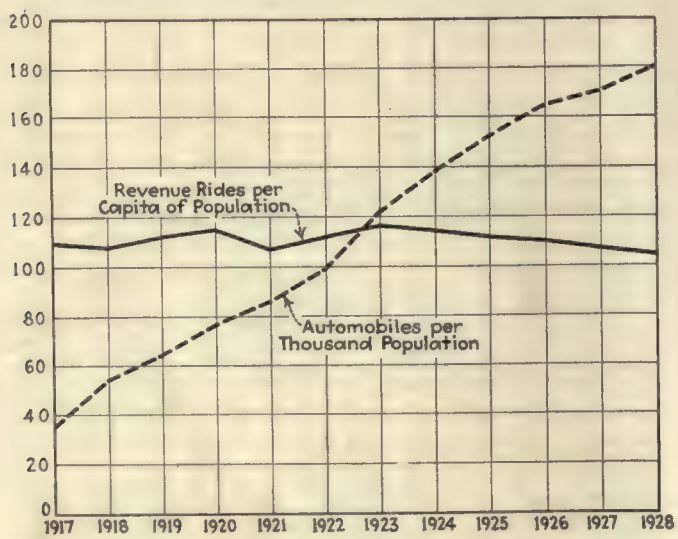


Chart 3—Revenue rides per capita of population on electric railways of the United States and subsidiary bus lines, in comparison with automobile registrations. Chart prepared by A.E.R.A. Traffic figures for 1917 and 1922 from U. S. Census. Balance of traffic figures from A.E.R.A. estimates. Automobile registrations from N.A.C.C.

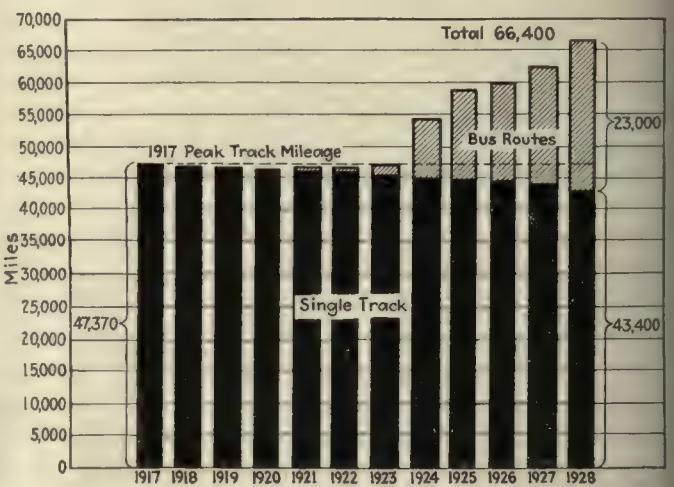


Chart 4—Electric railway track and bus route mileage in United States and Canada. Data for the United States for 1917 and 1922 from U. S. census. Canadian mileage and intervening years from data collected from McGraw Electric Railway Directory, annual statistical numbers of *Electric Railway Journal* and A.E.R.A. data

All of this is not to say that the growth in the use of private vehicles has not had serious effects upon the public transportation business. Although the number of riders has remained about constant, public transportation rides have failed to keep pace with the growth in population, and the number of rides per inhabitant has dropped steadily during the period under discussion. Furthermore, there has been a large increase in the habit of moving about, produced primarily by the con-

venience and comfort of individual transportation. To put this another way, there has been an increase in the market for transportation, but public transportation agencies have failed to profit by any material proportion of this increased demand.

The situation is shown graphically in Chart No. 3 prepared by the American Electric Railway Association. A steady drop in the number of revenue rides per capita of population is shown from 1923 to the present time. It is therefore apparent that since the total rides on public transportation vehicles has remained about constant during this period, the drop in riding habit has just about balanced the increase in population.

Thus it requires more than a mere year-to-year comparison of traffic figures to show in true perspective the status of the local transportation industry. It has failed to gain in total number of riders. There has been a gradual reduction in the miles of track in service as unprofitable lines have been lopped off; but there has been a greater gain in bus routes and in bus mileage than the decrease in rail mileage, so that the total miles of route of public transportation service have increased materially.

From 1922 to 1928, the total length of single track operated by electric railways was reduced about 3,000 miles. On the other hand, preliminary figures indicate approximately 23,000 miles of bus routes operated

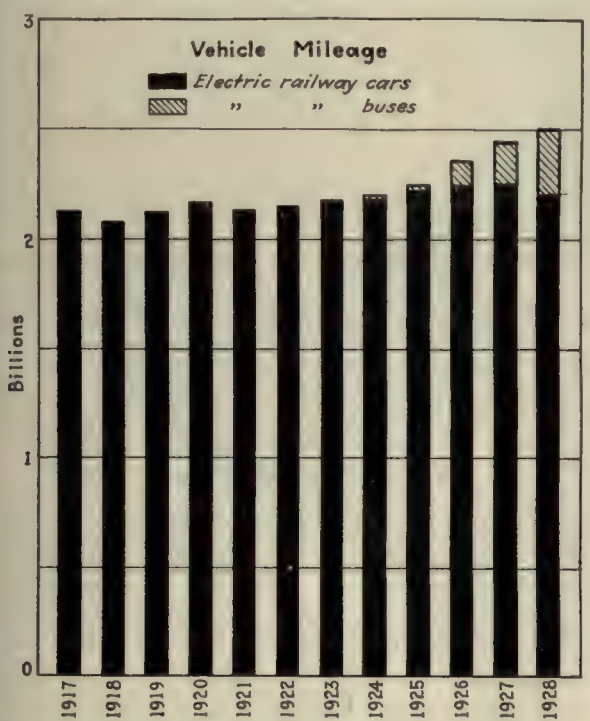


Chart 5—Total revenue car-miles and bus-miles operated annually by electric railways. Car mileage for 1917 and 1922 from U. S. census. Car mileage for other years from A.E.R.A.

in regular scheduled service by these companies or their subsidiaries at the end of 1928. These figures are shown graphically in the accompanying Chart No. 4.

A measure of the character of service rendered by public transportation vehicles is given in Chart No. 5 showing car and bus mileage by years. Referring again to the last complete census date, 1922, the total revenue car-miles operated were 2,124,523,000. In 1928 the figure was approximately 2,190,000,000 revenue car

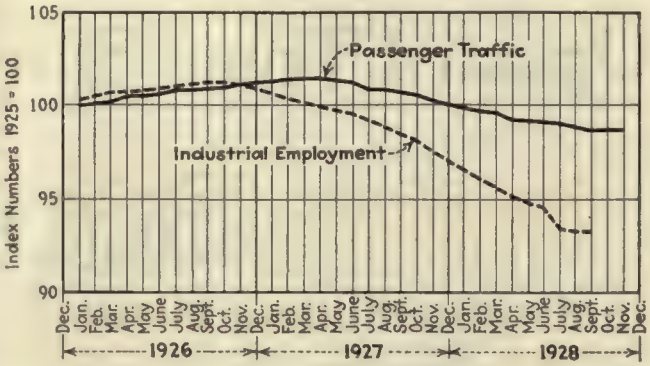


Chart 6—Trend of passenger traffic and industrial employment. Chart prepared by A.E.R.A. Curves represent the moving monthly average obtained by dividing the totals for twelve months at the end of each month by 12. Employment data from U. S. Bureau of Labor Statistics

miles, or an increase of approximately 65,000,000 car miles per year, despite a decrease of approximately 3,000 single track miles of track in service. Furthermore there were operated in 1928 approximately 310,000,000 bus miles, thus making a total of 375,000,000 vehicle miles of increased service operated in 1928 in comparison with 1922. The variations by years are shown graphically in Chart No. 5.

Two additional charts complete the presentation of basic trends in the industry. Chart No. 6 shows the relation between passenger traffic on electric railways and industrial employment, as prepared by the American Electric Railway Association from car and bus passenger data reported by 201 properties, and from employment statistics furnished by the United States Bureau of Labor Statistics.

Explanation for the increased revenue figures shown in Chart No. 1 in the face of a static volume of riding, is found in the gradual shift of the basic fare from 5 cents to 10 cents, shown clearly in Chart No. 7.

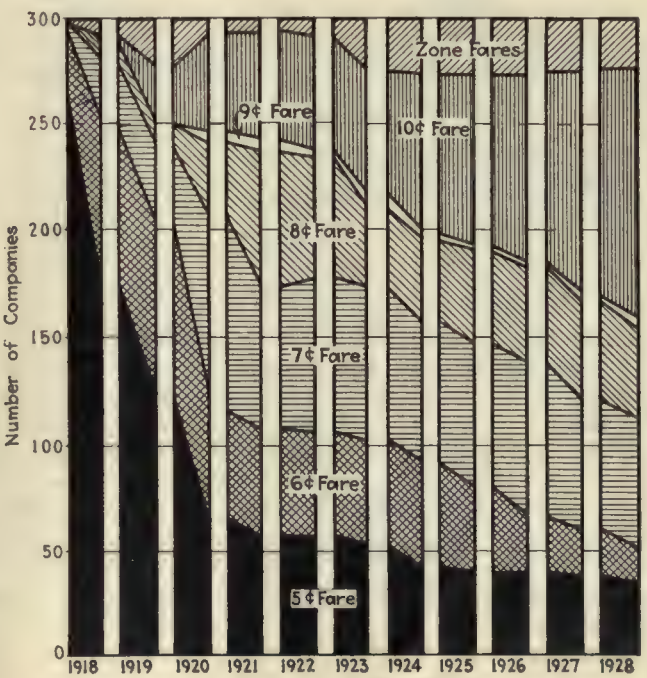


Chart 7—Distribution and trend of fares based upon reports by 300 companies in cities of more than 25,000 population, to the American Electric Railway Association

Upward Trend Shown by

BUDGET FIGURES

Total expenditures for 1928 exceeded those for 1927, with a further increase indicated for 1929. Car purchases will show a large increase and bus purchases a slight increase, while expenditures for power equipment and way and structures will recede slightly

RECOVERING from the low ebb of 1927, total expenditures for new plant and maintenance materials in the electric railway industry showed a moderate increase for 1928. Budgets for 1929 indicate that expenditures during the coming year will be substantially larger than during the past twelve months. Although the figure for 1928 of $225,730,000 is only a slight increase over the low mark of $225,271,000 in 1927, it indicates that the decrease has been checked. This fact is further supported by the forecast for 1929, which was placed by the industry at $229,500,000, an increase of $4,000,000. This is not a large increase but it is sufficient to indicate that the industry plans to do better than hold its own.

Electric railways have been making improvement plans for some time, and the expenditures, the best business barometer known, are showing the results. With operating costs, both for material and labor, mounting steadily and little relief coming in the way of increased fares, the situation was discouraging. Naturally, this had a serious effect on the expenditures. Fewer cars were bought, less track was built and savings were made wherever possible in maintenance material. The awakening of the railways to the need for readjusting their methods and thinking brought about an entirely different situation. When this occurred it was only a question of time when the industry would re-establish itself and restore its purchasing power. The small decrease which occurred between 1926 and 1927 was a good indication that the bottom had about been reached. The process of development now seems to be definitely under way. No startling increases can be expected in the next few years, but a steady climb can reasonably be looked for. The upturn was accomplished through consistent efforts to improve service, equipment and public relations, and the

Purchases Planned by Electric Railways for 1929, Compared with Actual Figures for Past Years Compiled by "Electric Railway Journal"

New Plant and Equipment—Capital

	1924	1925	1926	1927	1928	Forecast 1929
Way and structures.	$56,000,000	$52,400,000	$51,200,000	$77,365,000	$90,050,000	$77,800,000
Cars	60,200,000	50,400,000	40,000,000	34,758,000	18,900,000	31,100,000
Buses		15,680,000	17,540,000	14,368,000	19,100,000	20,300,000
Power equipment...	17,000,000	5,150,000	7,640,000	3,561,000	7,300,000	6,900,000
Total.....	$133,200,000	$123,630,000	$116,380,000	$130,052,000	$135,350,000	$136,100,000

Maintenance Materials—Operating

Way and structures.	$57,500,000	$56,900,000	$50,000,000	$40,517,000	$31,040,000	$32,750,000
Cars	54,000,000	54,700,000	47,800,000	36,941,000	35,200,000	36,100,000
Buses		7,370,000	7,500,000	9,451,000	15,040,000	16,100,000
Power equipment...	18,000,000	22,650,000	11,370,000	8,310,000	9,100,000	8,450,000
Total.....	$129,500,000	$141,620,000	$116,670,000	$95,219,000	$90,380,000	$93,400,000

Total of New Plant and Equipment, and Maintenance Materials

Way and structures.	$113,500,000	$109,300,000	$101,200,000	$117,882,000	$121,090,000	$110,550,000
Cars	114,200,000	105,100,000	87,800,000	71,699,000	54,100,000	67,200,000
Buses		23,050,000	25,040,000	23,819,000	34,140,000	36,400,000
Power equipment...	35,000,000	27,800,000	19,010,000	11,871,000	16,400,000	15,350,000
Grand total....	$262,700,000	$265,250,000	$233,050,000	$225,271,000	$225,730,000	$229,500,000

progress in the future will depend on how earnestly these efforts are continued.

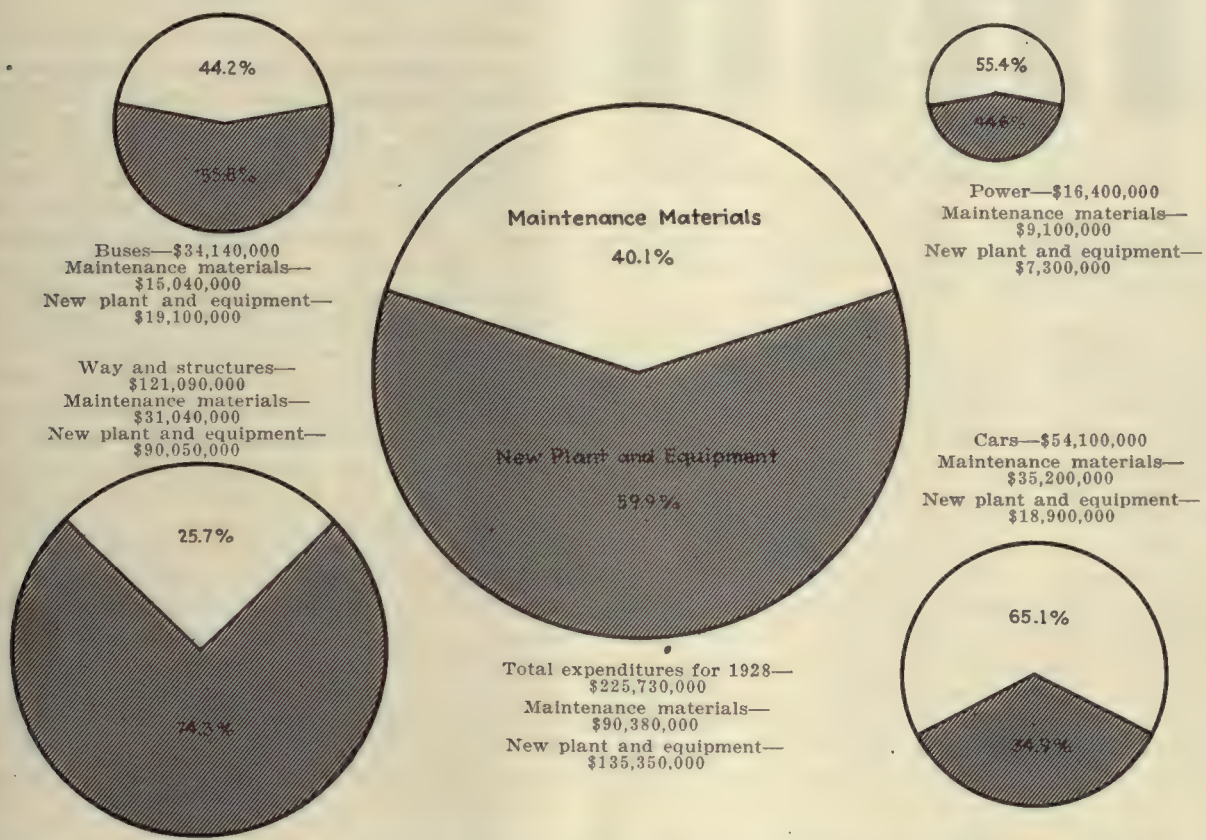
Aside from the important trend of total expenditures, there are two other outstanding trends shown by the figures. The first is the large increase contemplated in car purchases and the second the track activity preceding this buying. The budgets indicate that the car figure will soar from $18,900,000 in 1928 to $31,100,000 for 1929. This is an increase of $12,200,000, or 64.5 per cent. The figure for 1928 represents approximately $14,000,000 for new rolling stock and $4,900,000 for rebuilding cars and other overhaul work charged to capital account. The estimated figure for 1929, however, probably will include a larger percentage for new cars.

Estimates of expenditures are confirmed by definite plans for the purchase of new cars. Six railways alone have indicated that they plan to purchase a total of 513 cars, in lots of 115, 106, 100, 100, 50 and 42. Considering the fact that only 700 passenger cars were bought during 1928, the definite information that these six companies will buy 513 cars this year is extremely encouraging. Moreover, numerous other companies have stated that they intend to buy new rolling stock. In fact 40 per cent of all the railways submitting budget figures expressed the intention of making expenditures for new cars and car equipment.

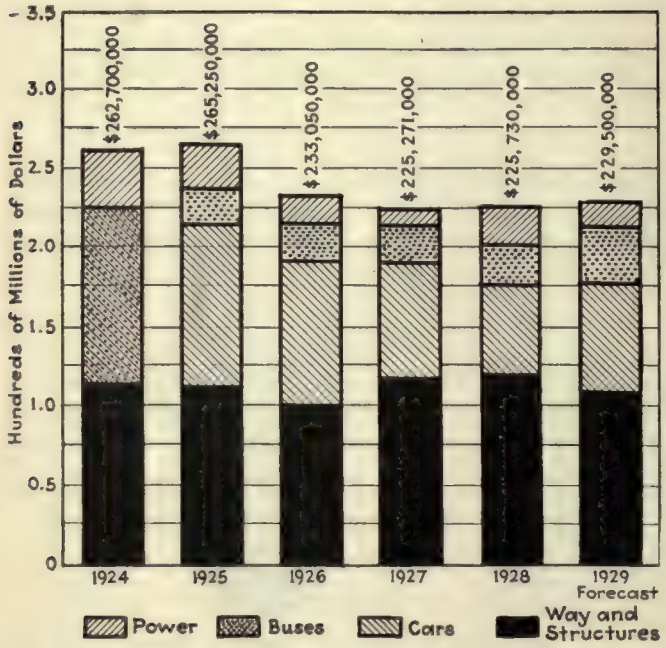
While the volume of car purchases in 1928 was regretably low, this was not entirely unexpected. For the past three years the car manufacturers have been experimenting with new cars and operators have been delaying their purchases, awaiting the outcome of this experimentation. It was anticipated that no radical developments would be made during the past year and that the electric railways would decide to invest in more rolling stock, but the experimentation continued and several new designs made their appearance, some embodying radical departures from the standard practice. This, of course, had the effect of causing managements to postpone purchases and was largely responsible for the decrease in cars bought. Satisfactory designs including the latest developments are now available, and companies that have been delaying their ordering of equipment for the past two or three years evidently intend to go ahead with purchases.

Expenditures for Way and Structures Reach New High Mark

Great activity in track construction and reconstruction during the past year is reflected in the large increase in the way and structures item. Although the expenditures for 1927 showed an increase of $26,000,000 over the 1926 figure, the 1928 figure shows a still further increase of $13,000,000, making the new total $90,050,000. It is notable that the actual expenditures exceeded by half a million dollars the forecast made for the year. Many large properties rehabilitated their tracks in 1928 and made extensions, several companies investing extremely large sums in new track. The information received a year ago indicated that the track activity evidenced in 1927 was to continue and the actual figures for the past year proved this forecast to be true. A considerable number of garages, carhouses and other buildings were constructed during the year, helping to increase this figure. Conditions vary so greatly on different properties that it would be impossible to arrive at an average figure for the division of way and structures expenditures between way accounts and structures accounts, but it is evident



How the total of $229,500,000 was divided among the four accounts of way and structures, cars, buses and power equipment. Each circle is divided to show how the amounts are allocated, the shaded portions representing new plant and equipment, and the unshaded portions the maintenance materials



The slight increase in total expenditures in 1928 over 1927 and the estimated increase for 1929 indicates that the decline during the three preceding years has been checked and that a steady upward climb may be expected

that the latter represent a large proportion of the total.

The budget for 1929 in way and structures shows a slight recession from the $90,050,000 mark to $77,800,000. This is not serious, however, because the figure is still above the previous high mark for 1927.

The steady decline in car purchases for the past three years with the indicated increase for the coming year and the opposite trend in way and structures, an increase for the past three years and a decrease predicted in 1929, indicates a definite trend. Operators were taking advantage of the unsettled car situation to rehabilitate track, but now that they have their track in fair condition they are turning to the purchase of new cars. No doubt many companies will reconstruct more track after securing new equipment. This should give a balancing effect and a resulting return to normal in most accounts in another year or two. This trend further supports the explanation in the opening paragraph that the industry is taking the necessary steps to improve its service and equipment and that a gradual stabilization is being obtained. The fact that the industry is improving its track and preparing to buy new cars is also conclusive proof that the leaders have faith in the local transportation business.

1928 Shows Big Increase in Buses

Bus manufacturers enjoyed the best year in sales to electric railways since the Journal has been recording these budget figures. The total number purchased exceeded 2,400, surpassing the previous high mark made in 1926 of more than 2,200. The purchases totaled the sum of $19,100,000, exceeding the figure for 1927 by almost $5,000,000, and the forecast for 1928 by $4,000,000. The amount expended for buses in 1928 exceeds the figure for 1926, when the next highest number of buses were purchased, by a million and a half dollars. More than 450 double-deck buses and large capacity street car type coaches, Twin Coaches, A.C.F. Metropolitans and Versares, were bought during the year, and of the smaller buses almost 1,000 had seating capacities of between 29 and 33 passengers.

It is of particular interest that the bus purchases for 1929 are estimated to exceed the 1928 figure by more than $1,000,000. No doubt, each year more and more buses are being bought to replace old ones. This type of vehicle has been used intensively now for more than four years and many of the first buses bought are being replaced. Each year this figure will account for a larger share of the total buses bought. Railways have been careful in adopting the bus and have determined its proper place, thus assuring the stability of this form of transportation. Because of this fact, it is reasonable to assume that in another year or two, the buses for replacement will be approximately the same as the number ordered in the years when it was being adopted.

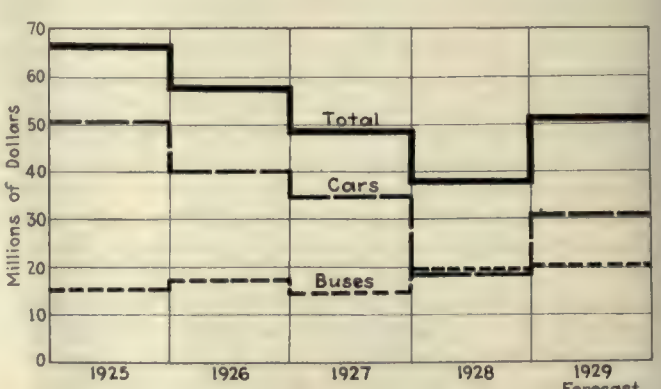
Total Figure for Buses and Cars Is Low

Because of the large decrease in car purchases during the past year the total figure for cars and buses dropped to a new low level. In 1925, the total was $66,080,000, but this fell to $57,540,000 in 1926, to $49,126,000 in 1927 and to $38,000,000 in 1928. For the past two or three years the car situation has been unsettled, as pointed out previously, and this accounts for the interruption of car buying and the resulting decline in the totals. The definite information, however, that bus purchases will increase approximately $1,000,000 during 1929 and car purchases more than $12,000,000, indicates that the low point was reached in 1928 and that there will be a resumption of active buying during the present year. The diagram below shows the car and bus purchases for the years 1925 to 1928, with the forecasts for 1929.

Expenditures for new power plant, substation and line equipment showed a substantial increase over those for 1927. The figure mounted from $3,561,000 to $7,300,000. This figure is almost exactly what was forecast for 1928, showing that operators carried out their substation and distribution reconstruction programs as planned. Several companies in the past year installed new substation equipment as a part of their general modernization programs. The figure for 1929 of $6,900,000 represents a slight decline, but is far in excess of the 1927 figure and indicates that a great deal of activity will be shown in this department during the present year.

Maintenance Material Figures Remain Steady

The total figure for maintenance materials and supplies, charged to operating accounts only, shows a decrease for 1928 over 1927, but this is not an appreciable



Car purchases continued to decline through 1928, while bus purchases mounted. It is significant, however, that both will show substantial increases during 1929

Maintenance Materials and Labor

		Way and Structures	Cars	Buses	Power	Total
1927 Expenditures	Material	$40,517,000	$36,941,000	$9,451,000	$8,310,000	$95,219,000
	Labor	66,874,000	44,952,000	6,592,000	8,244,000	126,662,000
	Total	$107,391,000	$81,893,000	$16,043,000	$16,554,000	$221,881,000
1928 Expenditures	Material	$31,040,000	$35,200,000	$15,040,000	$9,100,000	$90,380,000
	Labor	50,400,000	49,300,000	11,870,000	6,580,000	118,150,000
	Total	$81,440,000	$84,500,000	$26,910,000	$15,680,000	$208,530,000
1929 Estimated Expenditures	Material	$32,750,000	$36,100,000	$16,100,000	$8,450,000	$93,400,000
	Labor	58,900,000	49,800,000	12,600,000	6,460,000	127,760,000
	Total	$91,650,000	$85,900,000	$28,700,000	$14,910,000	$221,160,000

amount and is explained largely by the decrease in maintenance materials for track, this, in turn, resulting from the great amount of track rebuilding activity of the past year. The total for 1928 was $90,380,000, as compared with $95,219,000 for 1927. The total estimated for 1929 shows a slight increase, reaching the figure of $93,400,000. The total of maintenance materials for cars shows only a $1,700,000 recession from the 1927 figure, which is a favorable figure compared with the previous recessions of $11,000,000 and $7,000,000 in the years 1927 and 1926, respectively. The 1929 figure shows a slight increase, so that it is evident that the low mark has been reached.

The way and structures figure shows a decrease amounting to more than $9,000,000, but this was to be expected with the large track reconstruction program carried out in the past year and the resulting charging of most of the material to capital account. An increase has been predicted, however, for the present year. This is in accordance with the decrease in way and structures expenditures charged to capital account, estimated for 1929. Materials for power plant, substation and line maintenance do not vary much, showing an increase in 1928 of $790,000, but dropping again to approximately the same figure in 1929.

Total for Maintenance Materials and Labor Drops Slightly

Expenditures during 1928 for maintenance materials and labor combined did not reach the 1927 figure. The total fell from $221,881,000 to $208,530,000, the figure for materials decreasing approximately $5,000,000 and for labor $8,500,000. The decrease is accounted for in the slight falling off in the power figure and the large decrease in the way and structures figure. To offset these decreases, there were increases in both the car and bus maintenance accounts, an increase of almost $3,000,000 for cars and almost $11,000,000 for buses. The advance recorded for buses no doubt is due to the large increase in the number to be maintained each year and the growing average age of the buses in service. The 1929 estimates show an increase in the total for all accounts, bringing the figure to $221,160,000, or approximately the same as for 1927. A slight decrease is predicted for power plant, substation and line maintenance, but increases are estimated for the other three accounts, the increase for way and structures being placed at $10,000,000. The variations in the maintenance accounts naturally are not very great, because most companies follow certain standards and do not change them much within a period of a year. The variation in the way and structures item, of course, is caused by the track reconstruction programs with the charging of much of the material and labor to capital account.

It is interesting to note the ratio of material to labor in each of the accounts. For way and structures, material represents 38.2 per cent of the total, for cars it represents 41.7 per cent, for buses 55.9 per cent and for power plant, substation and line maintenance, 58.1 per cent. With all accounts taken together the amount spent for material represents 43.3 per cent of the total. These percentages are approximately the same for the individual accounts as those indicated by the figures compiled last year.

Pertinent Facts Revealed by the Budget Data

During 1928:

The total for new plant and equipment and maintenance materials showed an increase, the first since 1925.

Bus purchases totaled $19,100,000, and increase of almost $5,000,000.

Way and structures expenditures exceeded the previous high mark made during 1927 by $13,000,000.

Power equipment expenditures more than doubled.

During 1929:

The total of all expenditures for new equipment and maintenance materials will increase almost $4,000,000.

Car purchases will increase $12,200,000, or 64.5 per cent of the 1928 figure.

Expenditures for power equipment, way and structures will drop slightly but will still remain high.

Buses will reach a new high mark at $20,300,000.

Electric Railway Executives Conf

Comment from many sections of the country tells of improvement in conditions. A fare adequate to permit companies to function properly is needed. Stimulation of off-peak riding is a pressing problem

SIGNIFICANT outlines of transportation conditions in 30 of the larger cities of the United States and Canada are given in a series of statements received from prominent railway executives in response to inquiries recently made by this paper. Wide variation is found in the problems which these executives are facing and in the methods used in their solution. A general tone of optimism runs through these statements. Confidence is expressed in the future under a fare adequate to permit the companies to function properly. A slight decrease in traffic is reported in some of these cities. In general, however, the net revenue has shown a small increase despite the reduction in traffic. Prospects for 1929 are encouraging. Definite predictions cannot be made concerning the volume of riding during the present year but indications are that it will not vary materially from that during the year just ended.

Traffic Promotion Directed Toward Stimulating Off-Peak Riding

BOSTON—No reason is seen by Edward Dana, general manager of the Boston Elevated Railway, for feeling that 1929 will be materially different from 1928. Speaking from the standpoint of street railway operation in a large city, it occurs to Mr. Dana that traffic figures must be looked on in the light of what is actually transpiring. As he sees it, the gross figures of revenue passengers carried for a twelve-month period on a street railway do not indicate the true situation. A mass transportation agency in a large city which carries the backbone of the traffic is subject to constantly increasing traffic during the rush hours, but is also subject to loss during the summer months owing to the increased practice of vacations throughout the business world and the improvement in the standard of living which allows families to use the automobile for pleasure. Not only that, but the apparent affluence of a very large part of the public has given it a taste for the taxi, a service coming more and more into public favor for quick individual haul for people who have the means to pay for it.

Mr. Dana wants to flatten the peak brought about by this situation. He is very frank. He says that the efforts of the Boston Elevated Railway in traffic promotion have been directed to the three summer months where traffic is off 10,000,000 revenue passengers a month compared with the winter months. In other words, as things have stood, rush-hour service, both in capacity provided and passengers handled, may be constantly increasing, yet the total number of passengers carried for the year shows a slight reduction. A state of affairs of this kind gives rise to erroneous conclusions as to the importance, necessity and actual facts of mass transportation service. On the Boston El. 1928 traffic shows a falling off of 1.2 per cent over 1927. A margin as close as that on a total of 37,000,000 people does not, in Mr. Dana's opinion, permit accurate prediction as to whether the totals during 1929 will be slightly less or slightly more.

SPRINGFIELD AND WORCESTER—With the improvement in the textile and other industries the Springfield Street Railway and the Worcester Consolidated Street Railway look forward to increased income during 1929. With the economies effected and the savings made through the addition of 50 new lightweight modern cars on each of the properties, C. V. Wood, the president, believes that in the coming year the systems will better the results of 1928. With considerable satisfaction he finds that the Springfield Street Railway net, exclusive of depreciation charges, is 3.4 times the bond interest requirements, and that of the Worcester Street Railway 2.3 times the bond interest requirements.

Approximate figures for the Springfield Street Railway and the Worcester Consolidated Street Railway available at this time show the total operating revenue of the Springfield Street Railway to be $2,763,000, the total operating expense $2,199,000 and the net operating revenue $564,000. This, notwithstanding a loss of more than $90,000 in revenue as compared with the year 1927, was made possible through a reduction of more than $158,000 in operating expenses. For the Worcester Consolidated Street Railway the total operating revenue was $3,088,000, the total operating expenses $2,466,000, leaving the net operating revenue $622,000. This, notwithstanding a loss of $58,000 in revenue as compared with 1927, was made possible through a reduction of more than $193,000 in operating expenses.

In both Springfield and Worcester more car-miles were operated during 1928 than in 1927. In the expenses as stated are included depreciation on electric cars, buses, power stations, other buildings, machinery, tools, etc. While the systems have sustained a loss in gross the expense of operation has been reduced through co-ordination of cars and buses and other facilities, resulting in an increase in the net income. The budget of the Springfield Street Railway for 1929 covers expenditures for new plant and equipment of $305,000, and maintenance, materials and labor of $515,000. On the Worcester property, new plant and equipment in the 1929 budget total $230,000, and maintenance, materials and labor $620,000.

NEW BEDFORD—Elton S. Wilde, president of the Union Street Railway, New Bedford, Mass., is optimistic over the prospects for 1929. During 1928 conditions with the company were not good, but then the great textile strike was in progress, lasting six months. In 1928 gross revenue of the railway at New Bedford decreased about 14 per cent compared with 1927.

NEW YORK CITY—In New York City, of course, the companies are struggling heroically against the limitations imposed by the 5-cent fare. There is one city system in particular, however, which reflects both urban and suburban operating conditions. It is the Third Avenue Railway. Not only that, but the company is a large operator of buses. The service rendered includes electric operation in Manhattan and the Bronx and all of lower Westchester County, including the cities of Yonkers, Mount Vernon, New Rochelle, the Pelhams,

dent of the Future

White Plains and the Village of Tarrytown. In addition buses are operated in the Bronx and in Westchester County connecting the city of White Plains with the villages of Elmsford, Ardsley, Dobbs Ferry, Hastings, Scarsdale, Tuckahoe, Harrison and Mamaroneck.

Thus it will be seen that the operation varies from the difficult and dense volume of traffic in midtown and lower Manhattan to service in the sparsely populated sections in Westchester County. Despite the trying conditions under which it operates the company has been able to keep its net revenue for the ten months of 1928 at a figure comparable with that of previous years. Operation of the electric lines in Manhattan shows a small decrease in the passengers carried and the gross revenue, but the electric operation in the Bronx shows an increase which a little more than offsets the decrease in Manhattan and accounts for the electric operation in both boroughs showing a slight advance.

Bus operation in the Bronx was not started until 1928, but the volume of traffic on the buses has increased steadily and the feeling is that this traffic will continue to increase in 1929.

The officers of the system are understood to feel that while operation in Manhattan may not show an increase, the system as a whole, because of the development north of the Harlem River —that is to say, in the borough of the Bronx and in the cities and villages in lower Westchester County—will continue to show through 1929 an increase in passengers carried and also an increase in the gross revenue. The ability of the management to increase the net revenue in the ratio comparable to that of the probable increase in the gross naturally will depend, to a great degree, on the cost of labor and material.

NEW YORK CITY—Better than at any time in the last five years is the outlook for the industry, according to W. H. Sawyer, president of Stevens & Wood. As Mr. Sawyer sees it, the industry has a fairly definite appreciation of the lines and routes and companies which have been or can be readjusted to meet the changed conditions. As a result there should be, and Mr. Sawyer believes there will be, an appreciable amount of buying of new equipment and rehabilitation material. This will not, in his opinion, be confined simply to the larger city companies, but will include an appreciable number of smaller companies in the smaller cities. He expects that interurban progress and buying will be spotty, the greatest development being on those lines which are making a definite and constructive drive for freight business at the same time they are rehabilitating their passenger equipment, so that they can not only get more passenger business but can have the benefit of a public-pleasing passenger department as an aid and advertisement for the securing of freight business.

Super-Service a Feature of New Jersey Operation

NEWARK—Material progress was made by the Public Service Co-ordinated Transport operating in New Jersey during 1928 in improving the local transportation provided and in placing its operation upon a sounder economic basis. During 1928 the company extended and improved its bus operation not only as regards regular local and intercommunity service, but also in respect to what the company calls "superservice," namely, service provided at higher rates with a more luxurious type of equipment. At the same time the company has built up an increasing charter bus business which has become an important part of its operations. It has improved its facilities for and its methods of maintenance, has expanded its operations both as to interstate and intrastate service and has been able to co-ordinate street car and bus operation to advantage.

In spite of the competition of the privately owned automobile, the demand for local transportation in the territory served by the company is increasing. The management of the New Jersey Company feels that such demand can be further accelerated by providing service which more closely meets the requirements of the riding public, and while there are many obstacles in the way—notably the outstanding obstacle of traffic congestion—the management is confident that, with the co-operation of the public authorities, it will be able to increase the attractiveness of the service it offers and so increase the number of its riders.

So far as the future development of the property is concerned, the policy of the company is firmly fixed. Its aim is to create for the territory it serves a comprehensive system of transit that shall embrace the various types of transportation facilities adapted to transportation needs. Experience is rapidly teaching the company how to make the most efficient use of these facilities, both from the standpoint of practical service and from that of sound economics.

This statement reflects the opinion of management of the company that while the problem presented is by no means solved, the outlook is more favorable than it has been for some years and there is reason to believe that the company is now on the upgrade.

PITTSBURGH—Continued efforts by the electric railways toward modernization of equipment and improvements in comfort and speed should result in greater achievements for the industry in 1929. So says Thomas Fitzgerald, general manager of the Pittsburgh Railways. He feels that the accomplishments of the electric railways in the face of severe automobile competition show the indispensability of this facility for mass transportation. He regards the present superiority of the electric car in point of economy, convenience and safety to be unquestioned. The Pittsburgh figures show total passenger revenue in 1927 to be $20,895,633 compared with $20,139,577 for 1928. The number of revenue passengers in 1927 was 262,061,272 compared with 251,874,571 in 1928.

HARRISBURG—Business conditions in and around Harrisburg, Pa., are only fair, reflecting the sluggish condition in the coal industry. On the Harrisburg Railways traffic for 1928 fell off slightly over 1927. This was due to the poor business conditions previously mentioned, and also to the fact that the use of the private automobile continues to increase at an amazing rate. In July, 1928, the company increased its cash fare from 6 cents to 7 cents. According to C. S. Crane, assistant to the president, prospects for 1929 indicate that railway traffic will probably continue to decline, but that the falling off may be expected to be less pronounced than the slump that was experienced in 1928.

ERIE—There are 25,000 registered automobiles in Erie, Pa., a city of 130,000 inhabitants. This means practically an automobile for each home. The Erie Railways has carried on most intensively in the past, and it intends to continue to make a bold bid for patronage, realizing, according to A. F. Tideswell, general manager, that the only way to hold patronage is to handle passengers with less waste of time en route to destination. To this end the company intends to endeavor to speed up its railway schedules approximately to 9 miles in the congested area and 11 to 12 miles in the more open territory, and to maintain its coach schedules at a speed of 15 m.p.h., between terminals. In Erie in 1928 there were 16 per cent fewer revenue passengers than in 1927. The gross revenue of the company at Erie was off 5 per cent over the similar period the year before and the net revenue off 5 per cent.

Fare Increase Helped Baltimore Company

BALTIMORE—Approximate figures for 1928 show a decrease in revenue passengers of 8.3 per cent on the lines of the United Railways & Electric Company, Baltimore, Md., an increase in operating revenue of one-half of 1 per cent, and an increase in net income of 5 per cent. The feeling of the management is that if the fare had not been increased the year undoubtedly would have shown a large decrease in both revenue and net income. The Baltimore management regards the outlook for 1929 as promising.

Factors believed to have contributed to the decrease in patronage in Baltimore are the large amount of unemployed persons and the inaugurating of a five-day week by sixteen of the 22 crafts in Baltimore, resulting in a loss of approximately 16 per cent of riders of these crafts. No other city, with the exception of St. Louis, where eight of the 22 crafts have adopted the five-day week, approaches Baltimore in this respect.

Baltimore's bank clearings were the lowest since 1925; postal receipts show a decrease of more than 1 per cent, compared with 1927; the construction of dwellings dropped from 3,343 in 1927 to 2,440 in 1928—a decrease of 27 per cent. Meanwhile pleasure automobile registration increased approximately 16 per cent.

Traffic in Baltimore has been slowed up by the installation of numerous traffic signals and this tends to decrease the number of revenue passengers, because, with the large increase in the number of privately owned automobiles, prospective street car patrons are quite frequently picked up by passing machines, and their fares thus lost to the railway.

The decrease in taxicab rates to 10 cents for a half mile ride and the adoption of cabs of the type of a private automobile have tended to take the short-distance riders from the street car.

WASHINGTON—Fare increases are not popular, as J. H. Hanna, president of the Capitol Traction Company, Washington, D. C., realizes, but along with Owen D. Young, he also realizes that the transportation industry cannot prosper in communities that have failed to acknowledge that an economic problem is involved and that the payment for service must at least equal the cost of the service, including a proper return on the value of the property used in the interest of the public.

Mr. Hanna says that no opportunity should be overlooked to make public transportation as attractive as possible, but at the same time he does not see any real justification for expecting improvement in the situation in the immediate future. He feels that rail transportation in cities is and will continue to be necessary and that the present facilities are bound to be adjusted within the next two or three years.

The number of revenue passengers carried by his company decreased 3.7 per cent in 1928, compared with the previous year, a rate slightly less than prevailed during the preceding year. Existing standards and service were maintained. Operating expenses decreased less than 2 per cent. Washington has a particularly trying parking situation, but despite this, the use of the private automobile has increased, and this, of course, is the principal reason for the loss in revenue by the Capitol Traction Company. He is opposed to the institution of any measures that would tend to decrease the effectiveness of the present service, but he feels that only by the use of one-man cars and in some instances the use of larger units is it possible to effect substantial savings in operating expenses without jeopardizing the quality and attractiveness of the service, thus defeating the desired aim. Any further falling off in traffic can be met only with an increase in fares.

WASHINGTON—Opinions similar to those expressed by Mr. Hanna are held by W. F. Ham, president of the Washington Railway & Electric Company. As Mr. Ham sees it, the downward trend of traffic will probably not reach its limit until the use of private automobiles approaches a higher point of saturation than appears now to exist. Traffic, according to him, will have to be further increased before the necessary remedial action is taken by regulatory authorities further restricting the parking of the automobile. When such rules have been promulgated, the railway can then hope for a return of much of its lost traffic. On his own line the loss in traffic is attributed solely to the use of the private automobile, the registration of such vehicles in 1928 showing an increase of more than 10 per cent over those for 1927. Indications are that the loss in passengers carried by the company in 1928 will be approximately 1½ per cent. There will be a loss in gross revenue in 1928 of approximately $60,000, but through economies, the company expects that its operating income in 1928 will be approximately that of 1927. For 1929 the traffic outlook does not seem to be any brighter. The company anticipates a loss in traffic of about 1¾ per cent.

More Intensive Selling Plan Ahead in Virginia

RICHMOND—Estimates of earnings from transportation operation made by the Virginia Electric & Power Company show that the gross earnings for the year 1928 will be less than 1 per cent below the earnings for the year 1927. The railway operations for 1928 show a decrease of 4.5 per cent and the bus operations show an increase of 9.3 per cent. The officers of the company have estimated that the total gross earnings from transportation operation for 1929 will be approximately the same as for the year 1928. In arriving at this figure they have been mindful of the ever-increasing use of the private automobile and the general tendency of earnings from transportation operation to decrease in cities of the size of those in which the company operates.

With the natural increase in riding which results from increase in population and activities in the communities which the companies serve, together with a more intensive plan of selling transportation which the company expects to put into effect, the officers believe that any further loss in revenue due to increased use of the private automobile during the year 1929 will be offset, and that the total gross earnings of the company from transportation operations will be not less for the year 1929 than for the year 1928.

W. E. Wood, president, says that the company's estimate of transportation operating expenses for the year 1928 shows a reduction of 2.2 per cent below the operating expenses for 1927, railway 6.5 per cent decrease, and bus 8.1 per cent increase. The decrease in railway expenses was brought about by greater use of one-man cars and increased efficiency in maintenance.

The company is now operating about 30 per cent two-man cars, the replacement of which with one-man operation would mean a considerable further saving in operating expenses.

ATLANTA—F. L. Butler, vice-president of the Georgia Power Company at Atlanta, says the system there has been able to hold practically all of its business, and with improved service expects to be able to continue to do so. The number of revenue passengers carried in Atlanta decreased, but the increase in fare enabled the system to show an increase in revenue from transportation of slightly more than $250,000 for the first eleven months.

General business conditions in Atlanta have been quiet during 1928, and revenue for December suffered as a result of the "flu" epidemic. Mr. Butler says one of the big problems facing the large cities is traffic congestion on downtown streets. Sight should not be lost of the ability of the street car to relieve this situation, and to that end the advantages of the street car should be brought to the attention of the city authorities, automobile clubs, and retail merchants' associations. The experiences of the past few years convince Mr. Butler that the street railway properties which make use of modern

methods and equipment will be able to show satisfactory net returns from their operation. The modern street car has so many inherent advantages for mass transportation in large communities that the public cannot fail to realize that it is the proper vehicle to use when safety, speed, comfort, convenience, and economy are considered. The revenue from transportation in Atlanta in 1928 was the highest in the company's history, and an increase is confidently expected by the company in the revenue in 1929.

New Orleans—Officers of the New Orleans Public Service, New Orleans, La., estimate that traffic on the railway and bus lines for 1929 will decrease 4 per cent. In 1927, the gross revenue of the railway department was $7,491,250, the net revenue $2,165,484, and the total of passengers carried 145,948,565, compared with gross revenue for 1928 of $7,122,168, net revenue of $1,979,501, and total passengers carried of 139,274,776. These figures are for the twelve months ended Nov. 30 in each of the years mentioned.

Greater Speed, Neighborhood Development, Intensive Operation and Merchandising Effective

Chicago—Chicago Surface Lines is preparing confidently for another increase in business. Although the Surface Lines are operating on a day-to-day permit and have therefore been unable to work out a financial policy which would make possible the extension of lines and an adequate increase in equipment, the consistent growth of business and the optimistic outlook for the future have justified the purchase of new cars by the use of a special renewal and equipment fund, and specifications are being worked out preparatory to ordering at once 100 new cars of improved design.

For 1928 the Chicago Surface Lines reports an increase in both riding and revenue. While the increase in revenue passengers was only 1.08 per cent, it tops a consistent annual increase for the last seven years, amounting to a total of 19 per cent since 1921. G. A. Richardson, vice-president, regards it as significant also that this growth in riding was made in the face of a decrease in industrial payrolls in Chicago of approximately 10 per cent in 1928, and also in spite of very active competition by other transportation agencies. Revenue passengers in 1928 totaled approximately 892,000,000 compared with 882,458,647 in the previous year, an increase of 9,541,353. Total rides were 1,618,200,000. Total revenue was $62,270,000 compared with $61,624,752, an increase of $645,248. Net earnings after deduction of operating expenses, taxes, renewals, and city compensation, were $10,250,200 compared with $10,235,993, an increase of $14,207, or 0.14 per cent. Service was increased to the extent of 635,083 car-miles, or 0.47 per cent. The total car-miles, including buses, for the year was 136,290,000.

Some new records were made in the twelve months. In October there were more passengers and earnings were greater than in any other month in the history of the system. Saturday, Dec. 22, set a new record for the number of rides in one day. Every month during the year with the exception of one showed an increase in total rides as compared with the corresponding month in previous years.

Among the reasons assigned for the consistent increase in riding on the Chicago Surface Lines are the following:

Increase in riding habit.—The number of rides on street cars has increased more rapidly than the poulation. It is an established fact that there is a growing tendency in Chicago to use street cars more for trips to shopping centers in the day and theaters and other amusements in the evening. This is shown particularly by the increase in off-peak riding. A considerable portion of the added service, as indicated by the increase in car-miles, has been in off-peak periods. Automobile owners are finding it more convenient to use the street cars to and from theaters and shopping centers because of the increasing difficulty in finding parking space. For errands about town the advantage of the street car as compared with the automobile are being recognized as never before. Advertising and publicity have helped to crystallize this opinion.

Greater convenience.—Careful scheduling and supervision of cars have resulted in placing service where and when it is needed. Every effort has been made to have a car always in sight of the waiting passengers. For example, on some of the heavy lines, where two-car trains are used for rush-hour periods, single car operation is maintained in the non-rush hours.

Neighborhood development. — The rapid growth of business centers in outlying sections of the city is encouraging more rides per person. Where shopping is done in the neighborhood center more trips are made to and from the stores than when a long journey must be made to the central business district. The influence of the growth in these neighborhood centers is reflected in the increased earnings on many lines.

Greater speed.—For some years the Chicago Surface Lines has been increasing the speed of operation, and passengers have learned that they reach their destinations by street cars almost as quickly as they do in using their private automobiles if time of parking and walking to and from parking space is taken into consideration. Street railway service is as rapid as taxicab service through congested areas. This encourages short-haul riding.

Greater courtesy and efficiency of employees.—Service has been made attractive by increasing the interest of employees in their work and making them better salesmen of the service.

Good maintenance of equipment.—Roadbed and equipment have been maintained in first-class condition, thus inviting rides.

Publicity and advertising.—By calling attention constantly to the convenience, economy and comprehensiveness of street railway service and by advertising special events and points of interest, considerable increase has been made in off-peak riding, such as Sunday service

FOR a business which popular opinion, a few years ago, put on its last legs, local transportation is doing very well. It made a far better showing than most businesses in 1928 and it is going forward to still greater accomplishment during 1929. Better understanding exists today between the public and local transportation companies than ever before in history. Service is being improved and costs kept down by co-ordinating rail cars and buses. Great improvements are being made in cars. Fares are being steadily increased. And the public is recognizing the need for common carrier transportation. The outlook is both hopeful and interesting, for a great transformation is taking place. —Lucius S. Storrs

Managing Director American Electric Railway Association

to the parks, morning and afternoon service to shopping centers and evening service to theaters.

Mr. Richardson feels that the continuance of this program and the addition of new equipment should result in another increase in riding during the coming year.

Improvement in business conditions and the solution of the Chicago traction problems—two possibilities in 1929—would have the effect of greatly stimulating street car riding.

CHICAGO.—According to Britton I. Budd, president of the Chicago, North Shore & Milwaukee Railroad, the year 1928 emphasized more clearly than ever before that service must be stressed to a still greater degree if the electric railway is to hold its patronage and increase its popularity with the public. Many of the companies are meeting modern requirements by getting improved equipment, by operating on faster and more frequent schedules, by adopting salesmanship methods in merchandising transportation service; and where this has been done the electric railway has not only held its own but has increased its business. That the electric railway is indispensable in local transportation service is today generally recognized. Its success in the future depends on how fully it seizes the opportunity to give the public better service than is given by any other transportation agency.

CINCINNATI—"Space, like time, is money," said Hudson Biery, public relations director of the Cincinnati Street Railway, Cincinnati, Ohio, speaking for his company recently. "People," Mr. Biery concluded, "have been converted to the soundness of saving downtown space as well as time."

Mr. Biery said his company during the coming year expected to consolidate the gains it has made during 1928. Among these, he listed track reconstruction, delivery of the remainder of the 100 new cars ordered from the Cincinnati Car Company, completion of the automatic power system and maximum benefits from the corporation's new and extensive car shops.

Cincinnati street cars, during 1927, carried 7,000,000 more passengers than in 1926. Mr. Biery predicted that the figures for 1928 would show an even more remarkable increase.

KANSAS CITY.—Riding during the peak hours in Kansas City is as great as or greater than at any time during the company's history. Despite this the decline in railway patronage has been 3½ per cent per annum and for the year 1928, compared with the year 1927, the same percentage decline is found. The loss has been sustained in the off-peak riding, influenced undoubtedly by the increased use of the private automobile, by the growth of outlying business community centers, with the consequent reduction in shopping riding, by the outlying picture theaters and increased use of the radio.

Gross revenues have closely followed the decline in the number of passengers, but net revenue from railway operation have increased slightly, reflecting the economies and reduction in operating expenses introduced in an effort to stem the tide of rising costs and falling patronage. The slight gain in railway operation has, however, been more than offset by the losses suffered through bus operations, making the net revenue for 1928 from all operations a decrease 15 per cent compared with 1927. For the coming year there appears to be no indication in Kansas City of an abatement of the influences to which the company there attributes the past steady decline in patronage. Mr. Buffe, vice-president in charge of operations, says the railway must make its product more salable and then sell it.

No Difficulty Under Broadminded Municipal Policy

OMAHA—It is becoming increasingly evident and more generally acknowledged, in the opinion of J. N. Shannahan, chairman of the Advisory Council of the American Electric Railway Association, and president of the Omaha & Council Bluffs Street Railway, that the electric railway is an essential industry and must receive a rate of fare which will pay a fair rate of return, thus inducing the flow of necessary money. The only alternative is to supplement a rate unfairly low by a subsidy from the tax budget.

His impression of the electric railway situation in cities of the size of Omaha and larger is that because of the ever-increasing traffic problem, the use of the privately-owned automobile, is approaching the saturation point. Where, under a cost-of-service contract or other broadminded municipal policies, a compensatory rate of fare is being received, the industry is on a sound footing. In Omaha revenue passengers for the last calendar year decreased 2.75 per cent. Railway gross revenues during the same time decreased 3.66 per cent and railway net revenue 5.84 per cent.

HOUSTON—Very satisfactory was the year 1928 compared with 1927 for the Houston Electric Company, Houston, Tex. Passengers carried show an increase, with a corresponding increase in gross and net revenue. During the year Houston has enjoyed a steady growth and normal business conditions, which undoubtedly are in a large measure responsible for the showing of the company. New equipment, consisting of both street cars and buses purchased during the latter part of 1927 and the early part of 1928, have made the company's service more attractive to the riding public, and Jeff Alexander, the manager, feels that this accounts for a portion of the increases. During 1929 the company expects to continue to go forward.

DALLAS—With the very rapid increase in the number of automobiles in use, the management of the Dallas Railway & Terminal Company, Dallas, Tex., feels that if it can realize figures which it has set out in an estimate made for 1929 the showing will be all that can be hoped. To the end that the matter may be better understood Richard Meriwether, vice-president and general manager, has recapitulated the number of passengers carried, gross revenue and net revenue for 1928, compared with 1927, and the budget estimate for 1929. The estimate of passengers for 1929 is 58,275,000 compared with 58,282,307 for 1928 and 58,604,913 for 1927; gross revenue for 1929 $3,072,335 compared with $3,072,873 for 1928 and $3,065,931; net revenue, $866,375 for 1929; $826,116 for 1928 and $866,082.

The reduction in net revenue for 1928 as compared with 1927 was due to abnormal maintenance and accident charges. As the figures indicate, the company expects to earn net revenue in 1929 amounting approximately to that earned in 1927.

DENVER—Despite a further decline in travel during the year 1928 and indications that the trend in this respect will continue during the coming year, H. S. Robertson, president of the Denver Tramway, is not unduly disturbed by the outlook. As he sees it, the percentage of passenger decrease, at least so far as his company is concerned, is growing smaller every year. This would indicate that the Denver company may be reaching the low point of travel recession. During the year the litigation over franchises and rates at Denver was satisfactorily determined, and this has helped the feeling of optimism concerning the new year. The company is hopeful that it will witness the readjustment of its relations with the city and that a constructive program will be worked out which will be beneficial to both the community and the company.

SALT LAKE CITY—Measures which have been suggested in the past throughout the industry as perhaps being most efficacious in compensating for decreased riding are being tried under local conditions at Salt Lake. These are the substitution of bus for street car service on outlying routes, reducing service on outlying routes, even to discontinuing such service when the loss therefrom becomes too great to be absorbed; abandoning city lines paralleled in walking distance by other lines, thereby permitting the concentration of more frequent service made more attractive to the car user, and efforts to lessen automobile pick-ups, substitution of a cheaper means of transportation than the street car on rails, scientific

studies of car routings and route requirements, and merchandising of the transportation product.

Mr. West is in agreement with the theory that there is and will continue to be a need for mass transportation in cities of any considerable size. If this theory is true and the railways perform a service essential to the community, they will survive despite the fact that the methods may vary from what is used now, but because the very need for the service rendered will, with increasing congestion and population, be realized generally by the public at large and public officials, who will not be able to escape the only remaining alternative of aiding in every way possible the supplying of the community's transportation needs on a basis that is fair and equitable to all concerned. In so far as the Utah Light & Traction Company, Salt Lake City, is concerned, riding is decreasing at present and Edward A. West, general manager, is not oversanguine about the outlook for 1929. On his own system the approximate decrease in per cent in 1928 over 1927 shows revenue passengers carried 1.3, gross revenue 5.5, and net revenue 1.7.

The manager of one fairly large property in the Far West, who prefers not to be quoted says that the increasing use of the privately owned auto, the development of neighboring shopping centers and the extensive use of the radio continue to cause a marked decline in the riding habits of the company's patrons. This is substantiated by the comparative income statement of the company.

It is the opinion of this official that in cities of the size of the one in which his company operates this decline will continue for some time in the future. He says relief from some source or sources must be obtained if the company is to continue to supply universal mass transportation of a character suited to the growth and prosperity of the city. Cognizant of the trend of things, he is not without hope, since he has indicated that his company has not yet exhausted all the avenues of approach to the possible answer to the question, but indicates confidentially that plans are in the making which it is only reasonable to expect will help the situation materially.

Los Angeles—The trend of electric railway business as it relates to the Pacific Electric Railway indicates a gradual increase of patronage in the more heavily populated centers due to the increase of auto congestion, loss of time by owners and drivers of private cars and the difficulty of finding convenient parking spaces. These factors, together with the improvements made in the railway service in car seating and in other car comforts, with the bus as auxiliaries, have resulted in an increase in the number of riders. Trial interurban fares, established April 19, 1928, representing a considerable reduction over the rates previously in effect, have increased traffic, but have not yet been sufficiently stimulative to offset the reduction in revenue which followed the change in rates. The status of these trial fares is uncertain. It appears that they probably will be increased. Constant attention to such matters as speeding up of traffic, elimination of unnecessary stops, separation of grades and the increase in rider comforts, has been followed by an unmistakable trend toward a gradual increase in both passengers and revenue. This statement reflects the situation on the Pacific Electric Railway as D. W. Pontius, vice-president and general manager sees it.

Canadian Companies Reap Reward of Intensive Merchandising

Levis—Transportation will continue to be sold intensively by the Levis Tramways, but the management does not expect to be able to increase revenue and traffic materially until industrial conditions at Levis improve. During the year 1928 the increase in passenger revenue was 7.2 per cent over the previous year. Revenue passengers carried during the year increased 9.6 per cent. Despite increased expense for snow removal, the net for the year 1928 will equal that of 1927. H. E. Weyman, the manager, regards the consistent increase in revenue and traffic for the last three years with the exception of 1928 as due to the progressive campaign by the railway to increase its revenue through various methods of selling transportation.

Toronto—Traffic on the system of the Toronto Transportation Commission, Toronto, Ont., in 1928 has been quite satisfactory, approximately 5,900,000 more passengers being carried on the street railway and motor bus lines than in 1927. This represents an increase of 3.15 per cent in revenue passengers, which at the average fare of 6.18 cents indicates improvement of about $365,000 in gross revenue. Motor coach operations, at separate fares, and not in competition with the street railway, totaled $850,000, or 50 per cent more than last year. The operating ratio for the railway was reduced from 60.8 to 57.7 per cent in 1928. About 16 per cent of the car mileage on this system is one-man operation. During the past year two major double-track extensions were made to the city system, one of 10.78 miles and the other of 2.92 miles of single track. These extensions are of standard track construction and replaced old open track on parallel right-of-way. According to D. W. Harvey, general manager for the commission, business conditions appear favorable for 1929, and he looks forward to continued improvement in traffic.

Winnipeg—Figures of net earnings of the railway lines of the Winnipeg Electric Company, Winnipeg, Man., are not available at this time, but the year 1928 showed an increase of $16,000 in passenger revenue and an increase of 177,400 in revenue passengers over 1927. The mild weather in November and December, 1928, contributed to a decrease in riding against that of the comparable months of the previous year, but all other months showed a substantial gain in riding. D. J. Graham, manager of the railway, feels that the prospects for 1929 are favorable to a substantial growth in riding, as the community is experiencing a marked increase in population.

FROM all sections of the country come optimistic statements from leaders in the industry as to its business in the coming year. The industry is still confronted with plenty of serious problems. Its personnel brings to the solution of these problems extended experience, abundant successful precedent and renewed vigor obtained from the solution of similar problems in the past. The progress of the industry is surely accelerating upward and onward.

—James P. Barnes

President American Electric Railway Association

Too Young for One Generat for the

Rigmarole: A review as ro(a)m antic as a traffic tangle in which old leaves, recording current events if not history, are turned over. A case of "In one (y)ear and out of the other"

By G. J. MacMurray
News Editor *Electric Railway Journal*

HISTORY is a suspender button, according to a popular commentator. It ties up the past with the future. Its right to exist depends entirely upon its ability to hold up the past to the present. If the record covers the facts, posterity is content. But facts are the dead things of chronology. Alone they impose severe limitations. I have made no promise to be too closely bound by facts. If I did, this article would not appear over my signature since I'd be like Sam, who when asked solemnly to swear to tell the truth, the whole truth and nothing but the truth answered: "Jedge, wif all dem limitations you jes put on me, Ah don't believe Ah have anything to say."

Still I may say nothing in six pages. It wouldn't be the first time. I've already written more than a hundred words and I haven't said a thing about street cars or buses, but I will. In fact, if I hadn't had to write this article I'd have entered the New York Talking Marathon and taken the railway situation for my text. No matter how much one says about the railways there's always something left over. The problem of the railways in trying to hold their audience is as difficult as was that of the playwright who, in creating a new show, needed for a particular part a young man who looked like Lindbergh; who was tall, blue-eyed, with a sense of humor and an air of distinction; and who had sex appeal.

These are popular specifications. It would almost seem that they had fallen into the hands of car and bus manufacturers, judging by the exhibit at the convention last fall in Cleveland. One look and I said to myself:

Tell me, tell me, little car
Are you all they say you are?
Are you car or are you bus,
And if you are, why all the fuss?

Come now, speak up, tell the truth,
Do you run on gas or juice?
With your lines so smart and trim,
Are you her or are you him?

Come now, 'fess up, don't hold back—
Built for road or, mayhap, track?
Who'd be sure, who could say,
Standing there in that mute way

You look like a bus, and perhaps it's so
But I'm not certain you're meant to go.
Come now, tell me, little car,
Are you all they say you are?

And I'm still waiting for the answer. Now if the railways will only buy some of these cars or buses, or car-buses, it will be great. Apparently that's how Wickwire felt about it.

Again old Bill Wise
Opened the convention's eyes.
With his sallies and his wit
He made his usual hit.
His remarks he titled rare
"Only the brave deserve the fare;"
And his words they could but mean
"Only game fish swim up stream."

Of course there's been a lot of trial and tribulation. Life's like that. But there has also been much evidence that things are not so bad. Like the fellow who sold everything in typewriter supplies except chewing gum, the electric railways certainly are trying to meet the public demand. But if the number of private automobiles continues to increase we shall get into a state where the theory of Malthus will begin to work, since there won't be street space sufficient to care for the traffic. Now that is not so ridiculous as it sounds. Chicago was one of the first places to tumble to that fact. It was a case of

Hi, diddle, diddle,
The street traffic riddle,
The trolley car stuck in the jam.
The public it tumbled
And did more than grumbled—
Parked autos it put under ban.

The whole thing has been gone into before at great length, but it is interesting to note that after approximately a year of enforcement of the nonparking ordinance in the Chicago Loop district there have been considerable increases in customers in stores in that district compared with the number arriving before the regulations went into effect, and merchants who bitterly opposed the ordinance have been completely won over to its support. This, of course, is like the fact that Henry Ford's plant is running again. It's rattling good news.

During the year there has been a lot of good advice on this traffic subject, which if taken, may be expected to be the forerunner of more good news on congestion relief. The Detroit traffic survey diagnosed that city's case of acute traffic congestion and prescribed $30,000 worth of remedy. But though the patient may pay the bill he must take the medicine, as well, if he expects relief. Hawley S. Simpson, traffic engineer, talked before the New York Association about increasing the capacity of the streets. Mr. Mitten offered to make a traffic survey in Philadelphia and to report the findings to an impartial body. Dr. Miller McClintock in his report on San Francisco condemned the jitney, suggested measures for street traffic control and made suggestions on electric railway service.

In New York it has been found that traffic delays cost $540,000,000 and form a staggering record of ineffi-



Philadelphia may be two hours away from New York, but it's not so slow

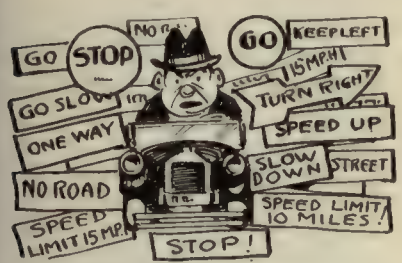
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It's a jumble, and that's what it will be unt'l traffic is co-ordinated

ciency in the methods of handling one of the nation's most pressing problems. In Boston the Erskine Bureau urged a reduction in street parking. In New Jersey John L. O'Toole of the Public Service elucidated a plan for relieving congestion in Newark. In Milwaukee McClellan & Junkersfeld stressed the need of early action by the city to reduce street congestion. On its part the American Electric Railway Association organized a committee on street traffic economies and this year has undertaken a broad study of transportation economies that promises to point the way toward organization of transportation facilities as the remedy for confusion, waste and congestion.

The changing aspects of transportation certainly were reflected in the avowed intention of the Transportation and Survey Commission at St. Louis to conduct the broadest kind of inquiry into the transportation needs of that community. A model municipal traffic ordinance certainly is needed. To that end the committee



The motorist certainly gets some bad breaks

of the National Conference on Street and Highway Safety has been at work, many provisions of the proposed model ordinance affecting the operation of street cars and buses being included in the tentative draft. As the Philadelphia *Ledger* pointed out editorially, the idea appears finally to be taking hold that the streets were made for moving traffic. *Liberty* even retained William Strum to tell the story of the traffic tangle in popular language.

Yet most of the reports seem to meet the same fate as did the suggestions the youth made to the editor for improving his paper. Following the matter up the youth had the temerity to ask: "Have you carried out any of my ideas." To which the editor said: "Did you meet the office boy with the wastepaper basket as you came up stairs." "Yes," said the youth, "I did." "Well," said the editor, "he was carrying out your ideas." We wouldn't say that the traffic reports have gone into the wastebaskets, but far too few of the ideas advanced have received the consideration they deserve.

It's like this:

When omnibus and trolley car
  Are licensed to a street
It seems a shame to thinking folks
  That autos park six deep.
If they were only cleared away
  It would, indeed, be neat.

Though try and try again
  Do operators with a will;
Not much comes of all they say
  The autos park there still
Because the selfish choose they shall
  And merchants say they will.

But some sweet day, not now, perhaps,
  The thing will be made right
Then out will go the parked auto
  In very hasty flight
Because the public willed it so
  And backed its right with fight.

Though Not Well Fed the Horse is Needed

As the industry's statistical Boswell, Edmund J. Murphy, has proved by a most imposing array of figures the total of passengers carried by the electric railways, including their buses, stays about the same from year to year, but there is a tendency toward a decrease in the proportion of passengers carried by rail and an increase of the proportion carried by bus. As Mr. Bradlee said, the fact that the electric railways have surmounted two tremendous obstacles in the past five years—inadequate fares caused by the reduced purchasing power of money, and loss of revenue through the greater use of the private auto—is conclusive proof of the fun-

damental soundness of the business; and substantiates the contention that the service rendered is an addition to the social and economic life of our communities. The evils that attended the era of increased wages and advances in the price of materials were



But some are so unreasonable that they do expect it

largely overcome by economies secured through the development of labor-saving devices, lighter car equipment, one-man car operation and improved maintenance methods. Still, as Owen D. Young said in his excellent address in Cleveland, "You can't expect a full day's work from a half-starved horse."

Companies like the Coffin prize contestants and others have done much to drive home the lesson of the inherent stability of public transportation because it is a public necessity. In fact, the fare question seems to have become quite secondary where satisfactory service is rendered. There has been much evidence that there is little public resistance to higher fares when they are made a part of a general program of service improvement. But there seems still to be plenty of room to increase gross earnings through operation of more attractive equipment, and decrease of costs through more scientific operation and maintenance. There is, of course, need for a cut in taxes and for a reduction of the paving burden borne by many companies. These matters need to be corrected because they are unfair.

During the year there has been much evidence that transportation, the product of the electric railways, can be sold only as the car and the bus and the service they give, are made attractive to the prospective customer. Pittsburgh joined the pioneers with its new cars, just as did the Cleveland Railway with its new articulated units. It is the avowed idea of President Alexander at Cleveland to try to furnish a seat for every passenger. To the same end of bettering its service the Boston Elevated Railway announced that it had retired the last of its wooden cars. Wilmington blossomed forth with new cars, Houston met the public's de luxe urge, Kansas City rebuilt all of its equipment, and car improvement occupied the spotlight at the Cleveland convention. Frank Fageol and Charley Birney drew a big hand with their new sample four-wheel cars and there have been persistent rumors that other builders are on their trail. In Salt Lake City, Ed West is trying out the trackless trolley with considerable success. Among the models of the year was the sample car of the Osgood-Bradley Company designed to meet 1929 transportation conditions. Here special attention was given to the proportions and the appearance of the body. Not only in the matter of new cars, but also in keeping the cars now in service in good condition are the electric railways trying to do their part.

But the bus has not been neglected. In fact, the railways have made great progress in co-ordinating the two services. Public Service Co-ordinated Transport continues to carry on aggressively in New Jersey. That company is now operating buses in interstate service between New Jersey and New York. Even while the versatile Frank R. Fageol was putting the time of the replacement of the street car by the bus twenty years away, he was busily engaged in producing a metamorphosis in the street car itself. Mr. Fageol actually proved himself to be an able publicist and a skillful diplomat. At the round-table discussion of the bus at the Cleveland convention, many had their say, but nobody seemed to go away saddened by what transpired. As Dick Graham so ably said, fact, not fancy, must guide in the use of the bus. Tom Noonan and others have set out deliberately to attract the auto rider to the bus and they have succeeded. That is just what the Department of Street Railways at Detroit has sought to do in replacing the ousted jitneys with buses of small capacity operated at high speed. The idea is so different from that which has come generally to be accepted that many have found it difficult to get the philosophy behind the move. But alert manufacturers seems to be on their toes, as evidenced by the new Yellow model W bus and the new Dodge, brought out to handle this class of business.

Nearly everywhere among the railways the idea of the chartered bus is spreading. In Oklahoma, a short interurban has been made the backbone of an extensive bus system. As part of the march of progress, the Morris County Traction Company has passed out of the picture as a railway operating between Newark and Lake Hopatcong, N. J., but the bus has taken its place, just as the bus has taken the place of a considerable part of the former Hudson Valley Railway. Instances of this kind used to send a shudder down the medulla oblongata of railway men, but now they have come to accept them as the inevitable working of the law of economic change. Despite all the talk about additional bus routes in New York City, the Equitable Coach matter is still in a state of suspense, although bus rights have been awarded in the Borough of the Bronx for lines which are operated by the Third Avenue Railway System. There appears now, however, to be every prospect that both the Boroughs of Brooklyn and Queens will see additional bus routes in service during 1929, more than likely under auspices that will make for their co-ordination with the present systems of transport rather than under an arrangement that might contemplate competition.

Competitive bus routes were awarded in Chicago, but the matter is by no means settled. A great deal yet remains to be learned about the bus. D. E. Druen, superintendent of bus maintenance of the Kansas City Railways, feels that bus operators will undoubtedly encounter some difficulty in establishing a proper and adequate fare until such time as the existing street car fare is raised to a point where it properly belongs. So far as the Virginia Electric & Power Company is concerned, attention to local requirements and excellent upkeep



Place the services so there is some system to them

made for success with the bus in Richmond and Norfolk. Feeder bus service has stimulated riding in Atlantic City just as it has in the other Jersey shore towns farther north in which the Coast Cities Railway operates. In Indianapolis unification of the bus and the railway lines was finally brought about, but not until the residents of the city had had

ocular demonstration of the futility of the operation of the two systems independently. Kansas City put through a new ordinance under which the bus service of the Kansas City Railways was rearranged, so that five trunk lines, one mid-city crosstown line and six feeder lines operate under the grant. Interstate legislation failed, but the Ohio commission ruled against an interstate carrier which persistently abused its operating rights by carrying passengers in local service under subterfuge.

Gossip Is the Remark of Some One Else

Comment is our own erudite remark about some one else. Gossip is the remark of some one else about us. Thus we are left just a little bit out in the cold on the matter when E. J. McIlraith, staff engineer of the Chicago Surface Lines, asks whether we are merely running cars. Money may talk, but in the railway business Mr. McIlraith has noticed how hard of hearing it is when it is called. In the railway world money used to talk but now it only whispers. Bill Bryan once said that wealth was a disease, but as usual the Great Commoner was not very specific. He didn't tell how to catch it.

Mr. McIlraith says that modern methods of public transportation must be created to meet the relentless pressure for improved facilities. The famous Darwin and Russell incident was thus re-enacted by the parallel in the remarks by the man from Chicago and those of President Stevens, who held in his Southwestern speech that the outstanding problem of the public transportation companies was that of keeping abreast of the times. E. G. Buckland, vice-president of the New York, New Haven & Hartford Railroad, also said that the only thing to do is to produce transportation of the kind that the people will buy at a price they will pay. And that is what the companies with which each of these men is identified have done. The same idea was expressed by Lucius Storrs when he said that the electric railways are not looking for charity. Walter A. Draper, president of the Cincinnati Street Railway, was another who said that the street railway systems are best fitted to provide transportation for a community. He was speaking before the United States Chamber of Commerce. It is the obligation of the street railways to provide the transportation and the people's to make this possible.

Ideas on service really were prolific. Dining car service was established on Jan. 16 on the interurban line between Milwaukee and Watertown. The Philadelphia Rapid Transit Company has kept incessantly at its campaign in the interest of the 80 per cent who patronize the street cars, demanding a square deal for them. The company at Fort Worth showed that good service can be given at low cost.

Buffalo went to 100 per cent one-man car operation, so also the Kansas City Railway went to all one-man operation. The St. Louis Public Service went over to skip stops on the Olive Street line. Service improvements occupied the attention of Southwestern transportation men at their meeting in the spring. Again Mr. McIlraith, speaking before the meeting of the Illinois Electric Railway Association last March, showed clearly that fast schedules are within



An ideal toward which many are working

the ability of almost any electric railway to achieve without expenditures or complications. In Atlanta, druggists were enlisted in the sale of street car tickets, and this in the home of Coca-Cola. Salt Lake was proclaimed as a city without strap hangers, thus beating both Mr. Mitten in Philadelphia and Colonel Alexander of Cleveland to it. Moreover, Charlie Gordon found that service first is the slogan of T.M.E.R. & L. company at Milwaukee, Wis. That service can be made more salable through better maintenance was a thought brought out in a new way by J. H. Walsh, superintendent of rolling stock and shops of the Middlesex & Boston Street Railway. Notable, of course, along this line was the article "Smoothing the Way for the Ride Prospect" in the JOURNAL for Sept. 8. And so the list might be expanded almost indefinitely.

That electric railway men are convinced of the value of the electric railway as a freight carrier is instanced in the elaborate plans of the Illinois Traction for improvements in and about St. Louis and the fact that the North Shore Line has increased its freight business 25 per cent; that the South Shore line is pushing the improvements on its line designed to add to the freight business; that $1,225,000 was appropriated for the construction of an electrified belt line at Oklahoma City to help increase the freight revenues of the electric railways there and that the Texas Electric Railways has recently developed plans for going after freight business more intensively and of tying in its lines for the interchange of freight with the steam carriers. Out in the Central West the Electric Railways Freight Company has been organized to take over the freight business of a number of the interurbans, the idea being that economies can be worked by this means which will redound to the benefit of both the companies and the shippers.

The Scissors Grinder Invariably Finds Things Dull

Submission of 3,600 ads in the public utility advertising contest, in which the successful contestants were the railways in Atlanta, Portland, Ore., and the Twin Cities offers convincing proof that the electric railways are awake to the possibilities of advertising. The Company at Birmingham also did some notable work in advertising its railway service. Novel color advertising was featured by the Pittsburgh Railways in its safety work. Window displays drew big crowds to the demonstrations of service staged by the Little Rock Railway & Electric Company and the Chicago, North Shore & Milwaukee. As Hudson R. Biery, of the Cincinnati Street Railway, said, publicity in modern business and industry is almost as vital as capital and labor. Successful selling requires a constant search for buyers. The qualities of the Gold Dust Twins or Palmolive Soap are well known only because they have been far more than twice-told tales.

After all Samson had the right idea about advertising. He took two columns and brought down the house. As Walter A. Draper said and as Labert St. Clair reiterated, a friendly public is the railway's principal asset and the chief executive must play his part in this development. A whole issue of the JOURNAL was dedicated to the doctrine of "Selling Better Transportation Better." Outstanding advertising and public relations work has also been done by the systems in Cleveland, Kansas City and San Francisco; the Kansas City Public Service Company especially, with its series "The Men Behind Your Trans-

portation Service." Best of all, nearly all of this work has reflected the disposition on the part of the companies to capitalize the opportunities for improving public relations through employee-customer contact. A wealth of ideas on this subject is contained in the article published in the JOURNAL, based on the report of the committee on employee-customer contact of the American Association. In short, the only man who invariably finds things dull is the scissors grinder.

Raymond S. Tompkins, of the United Railways & Electric Company, carried the message of the troubled trolley to the intelligentsia in the *American Mercury* for April and Mr. Mencken, the *Mercury's* editor, who does a great deal more straight thinking than is credited to him, asked the very question of the people of Baltimore, about starving the transportation horse and then expecting it to draw the load, that Mr. Young did at



The South Shore bull was served in the tangible form of steaks

Cleveland. Moreover, Mr. Mencken later took a hot fling in the Baltimore *Sun* at the parkers.

When Mencken bold wrote in the *Sun*
He sought to have some traffic fun.
He tilted here, he tilted there
And pranks he cut both rich and rare.

If left to him he'd short shrift make
Of those who most the street space take
Some petty whim to satisfy
And selfish interests gratify.

To Mencken bold, the *Mercury's* wizard
The hog that parks is a lazy lizard.
This wielder of words if he had his say
Would give the trolleys their right of way.

According to Captain Williams of the United Electric Railways, Providence, speaking at Cleveland, the street railway man of yesterday presents a striking resemblance to Rip Van Winkle. "Cap's" own paper, *Contact,* says that he threw a thunderbolt into the convention. Perhaps that's the way it impressed some of the old timers—and some of those not so old—when he queried: "Are we justified in lolling about in our lethargy while the rest of the world goes by and we are trodden under foot, smiling the while, sickishly, as we mutter 'The song is ended and not even the melody lingers on?'" As the Captain said, the public today has inhaled the delightful perfume of luxury. Only a modernized executive can cope with the situation. Whether or not you believe it, business has become the civilizer, as Ernest Elmo Calkins says in his books reviewed in the JOURNAL for the benefit of an industry that still has much to learn about merchandising. The day has passed when the thing to do was to put sand in the sugar, water the milk, wet the tobacco and then go upstairs for family prayers.

STAGE A REVIVAL; DON'T HOLD A WAKE

That this statement is true will be quickly realized if the reader will call to mind what the Chicago, North Shore & Milwaukee, the Cincinnati, Hamilton & Dayton, the Chicago, South Shore & South Bend, the Texas Electric Railway and other interurbans, the roads hardest hit by the competition of the private auto, have done. He will realize that platitudes put into practice certainly pay profits. The South Shore even went so far as to secure prize beef for slaughter so that the cuts could be served to the patrons of its diners. And remember that business on each of these properties was at one time on the mourner's bench. But the owners didn't hold a wake. They staged a revival. The landscape still belongs to the man who looks at it. If you don't believe that, read "A philosopher on the Interurban" in the JOURNAL for May 26. Not only that but remember the Book "Popularizing Public Transportation," a digest of the presentation made by the electric railways to the Charles A. Coffin Foundation. Street railway men should be encouraged by James Whitcomb Riley's lines:

I've allus noticed great success
Is mixed with troubles, more or less,

And it's the man who does the best
That gets more kicks than all the rest.

In speaking before the Association of Equipment Men, Southern Properties, E. P. Waller said that the electric railways can not hope to succeed in the effort to win back lost patronage unless they keep pace with the rapid development of the automobile. Similarly, J. P. Barnes, the new president of the American Electric Railway Association, said in his first speech in that capacity that expedients have no place in the relief of the modern transportation problem. Electric railways must do more than supply transportation service was the point emphasized by President Stevens, when in March he epitomized the principles which should guide participation of the utilities in civic activity. As Owen D. Young said the present is the age of a combination of imagination and knowledge. Railway men have both. The words of their spokesmen prove the first and the deeds of the operatives show that they are in no sense behind or the latter. To quote Mr. McIlraith again, skill and foresight will meet the pressure of competition. As Mr. Storrs put the case at the meeting of the New York Electric Railway Association last winter, "we must keep on the move or die." That certainly is the doctrine to which J. N. Shannahan, president of the Omaha & Council Bluffs Street Railway and the new head of the advisory council of the American Association, subscribes—and he didn't take long in Omaha to make it work. Let us not forget that progress should be imputed very largely to the builders of castles in Spain. Without vision the people perish.

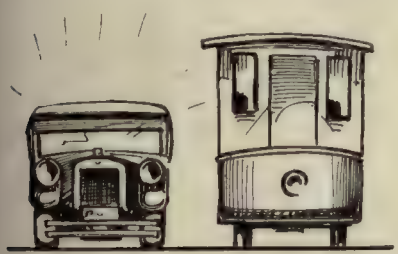


One can be too serious even for the Supreme Court

On the whole, the industry's most important fare case is that in New York City. Down to Washington went New York's tailor-made Mayor, the modern but male Cassandra of little old Bagdad-on-the-subway, to support Mr. Craig in his effort before the Supreme Court to preserve the 5-cent fare for New York City. For all their pains the lawyers for the city and the company had their "briefs" returned to them for shortening. Frank Sullivan was right when in the New York *World* he said that a brief on the subway rate increase by Ring Lardner would be far more fun than one on the same subject by Charlie Craig or Sam Untermyer and the New York *Times* irreverently pointed out in this connection that last year the city paid $14,000,0000 to meet the deficit on the old subways alone, and that nearly $40,000,000 goes for various rapid transit charges in the budget, to say

nothing of the hundreds of millions expended in the normal cost of construction out of bond issue money. Then Mr. Wallstein translated the city's $40,000,000 into nickels; 800,000,000 of them paid by the taxpayers for phantom rides they never took. It was all unkind, extremely unkind. The Mayor should not take too seriously the criticism that the people of New York are cumbered serfs of a pestilence of peanut politics. Such are the illiberality and slander to which enlightened rulers ever are subject.

Incidentally it should be mentioned that Frank Hedley, president of the Interborough, was the subject of a profile in the *New Yorker*; that more than 600 attended the dinner to Tom McCarter, president of the Public Service of New Jersey, culminating the celebration of the 25th anniversary of that company's founding;



The right place for them certainly was the Ford Museum of Antiques

that Joe Sullivan, of the Chicago Surface Lines, has been appointed World's Fair chairman for the public utility industry in furthering the enrollment campaign.

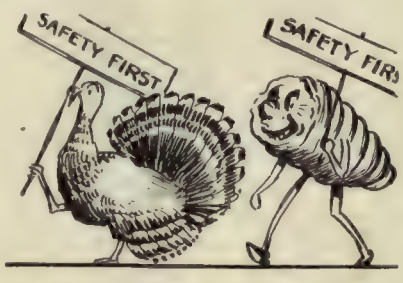
A man imposes on himself who taxes his memory. So if I overlook any of the things of human interest that have occurred during the year, it is because I am opposed to overburdening myself. Reception being good on March 31 last, I listened in while a group of railway men attained the unusual distinction of furnishing music to the entire world in a joint good-will program furnished by the employees of the Cleveland Railway and of the Pittsburgh Railways from station KDKA. Henry Ford also figured in the news in an unusual way. In Brooklyn he spotted among the historical relics of the Brooklyn City Railroad, a model of an old street car which he thought was a fitting representative of its day and generation among transportation vehicles for a place alongside of the Model T in the museum in Dearborn. There the car now rests, a contribution from the railway to the Ford collection. There are some old cars in Baltimore. One of them came in handy for use in the parade of progress which the company there staged last spring when 400 members of the local Chamber of Commerce inspected the railway plant and witnessed progress in car design, with the old horse car in the vanguard of an interesting procession. Again over the radio the Nashville Railway & Light Company entertained with a series of two-hour programs in which the purposes of the educational methods of the company in safety work were explained. On the other hand, the Third Avenue Railway voluntarily went off the air so as to help clear the channels in and around New York. Gene Tunney rode the trolley while he was in Grand Rapids. Nobody got hurt, not even the trolley. The indorsement which the bookish prizefighter gave to the local cars was done after the faultless manner of Professor William Lyon Phelps of Yale. But relics are in demand. Somebody else wants a horse car of former days, as evidenced by an ad that appeared in the JOURNAL, specifying a car with or without running gear but with carpet and stove if possible.

DITCHES GOING AT A PREMIUM

The new Broad Street rapid transit line in Philadelphia was placed in service on Nov. 2 under a temporary arrangement with the Philadelphia Rapid Transit Company. In October the Pennsylvania Railroad opened its Philadelphia, Chester and Wilmington service over the route equipped for electric operation. In midsummer the Brooklyn-Manhattan Transit opened the 14th street subway line. Also during the year the New York State Railways placed in service the subway at Rochester constructed in the bed of the canal there. The results of more than three months of experience with Detroit's surface rapid transit operation were reviewed in the JOURNAL. Of the somewhat similar projects in the making, the most important, perhaps, are proposals for the construction of the new terminal in Newark, N. J., to be used jointly by the Public Service Corporation and the Pennsylvania Railroad, with a high-speed local line into Newark in the bed of the Morris Canal; the subway proposal for Pittsburgh; the similar subway proposals for St. Louis and Detroit and agitation elsewhere of proposals along these lines but not quite so ambitious.

Negotiations for a new franchise in Chicago didn't get very far, but the Louisville Railway secured a twenty-year bus grant with an initial fare of 10 cents. At the election in Omaha in November the voters expressed their choice overwhelmingly for the new grant of the Omaha & Council Bluffs Street Railway. The new franchise in Toledo also has gone into effect, and the Community Traction Company, one of the hardest hit of the city properties, appears to be staging a successful comeback. The Market Street Railway in San Francisco failed to obtain the passage of revocable permits, pending a decision on the part of the city as to whether or not it will proceed to take over the company's property.

Nothing came of the attempt to legislate on the matter of the continuation of the plan of private ownership of the Boston Elevated Railway with public control. On the other hand, a bill of this kind was put



Awards for safety records were unusual

through in the interest of the Eastern Massachusetts Street Railway. A terminable permit bill was signed by Governor Smith of New York. In Illinois the home rule bill, intended to afford a measure of relief to the Chicago companies, was lost. The House Committee of the District of Columbia voted favorably on the resolution to authorize the merger of the railway and bus corporations operating in the District of Columbia, but the measure did not go through and the matter is now before the legislators for settlement.

The year was replete with plans for heavy electrification. The most important project of this kind to be announced was the proposal to electrify the Pennsylvania Railroad from New York to Wilmington, the proposals to electrify the Reading Railroad out of Philadelphia and the announcement of the decision to use 3,000 volts d.c. on the line of the Delaware, Lackawanna & Western on its route to Scranton. Work of converting the so-called narrow-gage railroad at Boston from steam to electricity was completed in the late fall, and this was followed by the

rumor that the New York Central hand in mind the electrification of its road from Croton-on-the-Hudson to Buffalo.

The Year's Prize Winners

What a big inning last year was for a lot of people! Mr. Wood down in Virginia won the Coffin award, Mr. Barnes in Louisville won the Brady safety medal, the Electric Railway Journal won the national

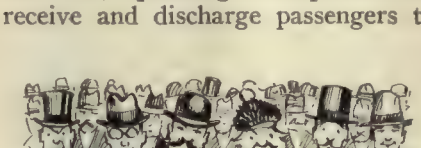


Detroit jitneys get a belated spanking

award among trade papers for outstanding service to its industry, James H. McGraw, the publisher of the Electric Railway Journal, got the 1927 medal for distinguished personal service rendered American commerce and industry through raising the standards of advertising, and we were picked again to write this review. But that is only part of the story. The Chicago, North Shore & Milwaukee R. R. won the *Electric Traction* speed trophy for the second time. In Chicago, also, there was a fitting banquet to celebrate the fact that 5,441 men of the Chicago Surface Lines had guided cars through the maze of traffic that is Chicago's without the semblance of an accident. There were many individual prize winners among the railway men of Brooklyn and other cities for their work in accident prevention. And just as this issue was in preparation, anouncement was made that the Penn-Ohio System has won the Brady medal for 1927—the third award of merit won by this property; i.e., the Coffin prize, the Forbes prize and now the Brady medal.

The Girl Who Received the Gift of Flowers

On the municipal ownership matter the people of Detroit were at first in raptures, like the girl when she received his gift of flowers. "Oh, they are perfectly lovely!" she exclaimed. "And there's even a little dew on them still." "Er-y-e-s," he stammered, "there is a little, but I intend to pay it on Saturday night." Detroit got the municipal ownership flowers, but there is still quite a little due on them. And the process of paying will go on for a long time. Ralph Stone, chairman of the board of the Detroit Trust Company, stated in a report made public last June that an increase in fare on the Detroit Municipal Railway was necessary, barring the possibility that the problem of the railway could be met by rearranging the annual debt maturity. Superintendent Boeken of the San Francisco Municipal Railway wants that system taken out of politics, and the sponsors for the Seattle Municipal Railway are still casting around for the magic expedient that will make it possible for that system to carry on successfully. If the Department of Street Railways at Detroit did something unusual in replacing the jitneys with buses of small capacity, it also has done something unusual in its combined electric railway and bus service, in which electric cars, operating as express cars, receive and discharge passengers to



Twenty-eight countries were represented at the Rome conference

buses, which run local. This form of service really was begun on Jefferson Avenue in Detroit on Sept. 18, 1927, but has since been extended.

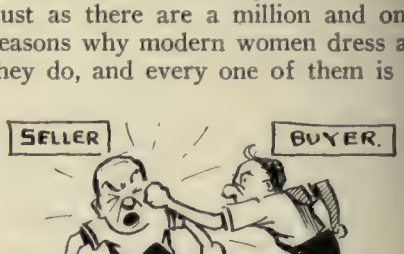
While Green You're Growing; When Ripe, You're Rotting

It was a very good idea on the part of the convention at Cleveland to get the benefit of the ideas of outsiders. There are some subjects on which the members of the industry are green and they are not afraid to admit it. They are like the man who hesitatingly interrupted one of Fred Mann's speeches at Dayton to ask a question. "Good," said Mann, "there's hope for you. While you're green you're growing; when you're ripe you're rotting." Mr. Kettering told how the automobile industry was still young. He certainly made a stimulating talk, as did Mr. Cochran, Mr. Young and the others.

But speaking of conventions it is well not to forget that the convention held by the Canadian Electric Railway Association last June at Toronto exceeded in attendance and in number and size of exhibits any ever held before by that body. At its mid-year meeting, the Central Electric Railway Association took stock of the present and the future. At the International conference in Rome, 28 countries were represented. Perusal of the proceedings at Rome shows the striking similarity between the problems of the manager abroad and those of the man at home. Moreover, it will be recalled that it was at the Southwest Association meeting in the spring that Mr. Stevens made his speech on the future of the electric railway. He then said that mass transportation would continue to be handled by the electric railways until some other form of transportation not now known is invented to take its place. He said: "We have the brains, the will, the energy and the desire to keep our industry abreast of the exacting requirements of the public and to do so at a profit. Let's go." It certainly was a great year for conventions in the United States, in Canada and abroad.

Too Old for One Generation; too Young for the Other

From all that has been said one might almost think that the electric railways were in the embarrassing position of being between two generations—too old for one and too young for the other. It is difficult to tell whether or not some of them are progressive or conservative. Some of the things they do make it seem one way and some another. In that respect they are like the girl who wears last year's hat, drives a this year's car and lives on next year's income. Just as there are a million and one reasons why modern women dress as they do, and every one of them is a



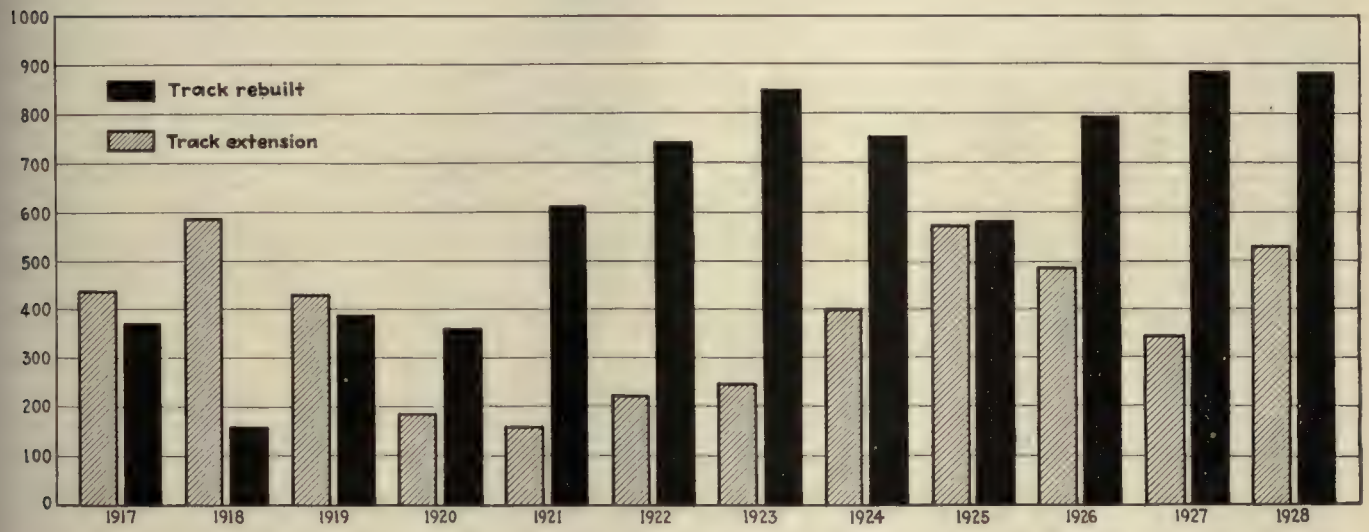
Buyers and sellers should fraternize, not fight

man, there are 120,000,000 reasons why the electric railways should keep up to date, and every one of them is a passenger.

And now I'm done.
The song I've sung
Time will soon efface
A piece *most* commonplace.
But this of you I ask,
In pity for my task
Forgive the limping rhymes;
The joke you've heard a thousand times.

Track Construction Greater

Mileages of new construction and reconstruction during 1928 exceed figures for previous year. Electrification of steam roads extended



Combined mileage of track rebuilt and extensions made was greatest in twelve years

ELECTRIC railway track construction activity during the past year was substantially greater than in the preceding twelve months. The mileage of extensions made in 1928 exceeded those of 1927 by more than 54 per cent, and the mileage of track rebuilt also was greater. At present the total of city and interurban electric trackage in the United States and Canada is about 43,400 miles. This is a decline of approximately 8 per cent since 1917 when the track mileage reached a peak of 47,370. Service on the track abandoned has been replaced in most instances by bus service.

The mileage of both city and interurban extensions last year was considerably more than that of the year previous. The extensions of city track totaled 184.15 miles, compared with 152.99 in 1927 and 193.20 in 1926. Interurban track extensions totaled 54.79 as compared with 39.42 miles in 1927.

The number of companies making extensions to city tracks in 1928 was 74 as compared with 80 in 1927, 75 in 1926 and 80 in 1925. The number of companies reporting interurban extensions was considerably more than in 1927, being 40 as compared with 34 in 1927, 38 in 1926 and 35 in 1925.

The largest city extension was constructed by the Board of Transportation, New York City. The total single-track miles, including the lines turned over to the Brooklyn-Manhattan Transit Corporation and the Interborough Rapid Transit Company for operation and the actual track constructed in the city's new subway, is 36.84 miles. Following this extension was that of the Division of Transportation of the city of Philadelphia, which completed 20.86 miles of track during the year. The city of Detroit, Department of Street Railways, constructed 16.49 miles of this track and the Toronto Transportation Commission built 14.59 miles of extension. The largest mileage of interurban track extensions during the year was made by the Milwaukee Electric Railway & Light Company, totaling 15.68 miles. The second largest interurban extensions were made by the Chicago, South Shore & South Bend Railroad, which installed 7.60 miles of new lines during the year.

Comparison of Track Construction by Years

Year	No. of Companies	Track Extensions — Miles — City	Track Extensions — Miles — Interurban	Track Extensions — Miles — Total	Track Rebuilt — Miles — City	Track Rebuilt — Miles — Interurban	Track Rebuilt — Miles — Total	Electrified Steam Lines, Miles
1908	157	(a)	(a)	1,174.5	(a)	(a)	(a)	84.00
1909	160	(a)	(a)	774.7	(a)	(a)	(a)	112.40
1910	217	(a)	(a)	1,204.8	(a)	(a)	(a)	192.40
1911	223	(a)	(a)	1,105.0	(a)	(a)	(a)	86.50
1912	171	(a)	(a)	869.4	(a)	(a)	(a)	80.80
1913	181	(a)	(a)	974.9	(a)	(a)	(a)	119.00
1914	163	(a)	(a)	716.5	(a)	(a)	(a)	229.00
1915	136	(a)	(a)	596.0	(a)	(a)	(a)	448.20
1916	104	115.40	240.90	356.30	(a)	(a)	(a)	388.00
1917	121	251.10	125.60	376.70	(a)	(a)	375.40	66.00
1918	80	216.41	97.41	313.82	(a)	(a)	155.43	275.70
1919	73	110.90	29.67	140.57	307.06	82.82	389.89	287.60
1920	87	145.69	30.87	176.56	246.21	115.56	361.77	8.92
1921	78	108.15	38.95	147.10	488.96	126.25	615.21	8.08
1922	104	126.27	85.11	211.38	584.75	154.95	739.70	12.35
1923	272	169.61	63.54	233.15	559.77	294.86	854.63	26.12
1924	243	218.09	93.99	312.08	585.51	178.82	764.33	83.39
1925	207	227.31	112.48	339.79	485.75	93.15	578.90	236.36
1926	236	193.20	124.76	317.96	594.35	208.17	802.52	169.52
1927	235	152.99	39.42	192.41	691.34	196.60	887.94	140.70
1928	231	184.15	54.79	238.94	674.00	220.73	894.73	276.14

(a) Information not available.

The total electrified track rebuilt during 1928 was 894.00 single-track miles, which was an increase over 1927 of 6 miles and was 91 miles more than 1926. The number of companies reporting tracks rebuilt during the past year was 205. This is a slight change from 1927 when 217 companies reported track rebuilt, 1926 when 181 companies made such reports and 1925 when the number was only 160. Similar to the previous year, ap-

Table I—Track Extension and Reconstruction in 1928

Name of Company	Extension, Miles: City	Extension, Miles: Interurban	Rebuilt, Miles: City	Rebuilt, Miles: Interurban
Alabama				
Birmingham Electric Co.	....	....	10.82	....
Mobile Light & R.R. Co.	....	....	.86	....
Arizona				
Phoenix Street Ry.	....	....	17.96	....
Arkansas				
Texarkana St. Ry.	....	....	0.06	....
California				
Key System Transit Co.	....	0.03	2.55	1.33
Los Angeles Ry.	0.29	....	6.66	....
Market Street Ry.	....	....	1.02	....
Municipal Ry. of San Francisco	9.48	....	0.75	....
Pacific Electric Ry.	....	3.63	2.45	33.87
San Diego Electric Ry.	0.37	....	2.85	....
Southern Pacific Co. (Elec. Div.)	....	1.12	....	....
Colorado				
Denver & Intermountain R.R.	0.02	....	0.06	....
Denver Tramway	0.51	....	5.31	....
Connecticut				
Connecticut Co.	0.58	0.01	14.77	3.08
Delaware				
Delaware Electric Power Co.	0.09	....	1.24	....
District of Columbia				
Capital Traction Co.	....	....	1.65	....
Washington Railway & Electric Co.	....	....	2.34	....
Florida				
Gulf Power Co.	....	....	1.15	....
Jacksonville Traction Co.	....	....	3.25	....
Miami Beach Ry.	....	....	0.17	....
Municipal Rys. City of St. Petersburg	....	....	0.75	....
Georgia				
Georgia Power Co.	0.89	....	7.44	0.06
Macon Ry. & Light Co.	....	....	0.10	....
Illinois				
Aurora, Elgin & Fox River Electric Co.	....	....	0.23	0.85
Chicago & Joliet Electric Ry.	....	....	0.63	....
Chicago, North Shore & Milwaukee R.R.	0.48	0.55	....	....
Chicago Surface Lines	0.51	....	34.88	....
Chicago & West Towns Ry.	....	....	....	1.75
Illinois Northern Utilities Co.	....	....	0.75	....
Illinois Terminal R.R. System	....	2.53	....	8.19
Illinois Power Co.	....	....	2.77	....
Illinois Traction System	....	....	....	16.00
Kewanee Public Service Co.	....	0.21	....	0.25
Tri-City Ry. of Illinois	....	....	2.20	....
Indiana				
Beech Grove Traction Corp.	0.10	....	....	....
Chicago, SouthBend & Northern Indiana Ry	....	....	4.06	....
Chicago, South Shore & South Bend R.R.	....	7.60	....	13.20
Gary Rys.	0.79	....	3.03	....
Hammond, Whiting & East Chicago Ry.	....	....	1.30	....
Indiana Service Corp.	2.98	0.09	....	5.00
Indianapolis Street Ry.	0.40	....	2.58	....
Interstate Public Service Co.	....	....	2.10	....
Lafayette Street Ry.	0.23	....	0.57	....
Southern Indiana Gas & Electric Co.	....	....	3.00	....
Southern Michigan Ry.	....	....	....	0.10
Terre Haute, Indianapolis & Eastern Traction Co.	....	....	0.39	....
Union Traction Co. of Indiana	0.06	0.41	0.37	1.22
Iowa				
Charles City Western Ry.	0.40	....	....	....
Clinton, Davenport & Muscatine Ry.	....	....	0.40	....
Tri-City Ry. of Iowa	....	....	0.60	....
Waterloo, Cedar Falls & Northern Ry.	....	2.10	....	1.83
Kansas				
Arkansas Valley Interurban Ry.	....	1.00	....	....
Joplin & Pittsburg Ry.	....	2.25	....	....
Kansas City, Leavenworth & Western Ry.	....	0.33	....	0.67
Kansas City, Merriam & Shawnee R.R.	....	....	....	7.09
Union Traction Co.	....	....	....	1.50
Kentucky				
Kentucky Traction & Terminal Co.	....	....	0.25	0.72
Louisville & Interurban R.R.	....	....	0.17	....
Louisville Ry.	0.56	....	4.37	....
Louisiana				
Louisiana Power & Light Co.	....	....	0.80	....
New Orleans Public Service Inc.	....	....	7.94	....
Maine				
Androscoggin & Kennebec Ry.	....	....	0.20	....
Bangor Hydro-Electric Co.	....	....	0.88	4.30
Biddeford & Saco R.R.	....	....	0.10	....
Central Maine Power Co.	....	....	0.50	....
Cumberland County Power & Light Co.	0.36	....	3.32	....
Waterville, Fairfield & Oakland Ry.	....	....	1.50	....
York Utilities Co.	....	....	1.50	....
Maryland				
Potomac Edison Co.	....	....	0.34	....
United Railways & Electric Co.	1.30	....	7.16	....
Massachusetts				
Berkshire Street Ry.	0.68	0.37	2.44	....
Boston Elevated Ry.	0.32	....	12.80	....
Boston, Worcester & New York Street Ry.	....	....	....	6.00
Eastern Massachusetts Street Ry.	0.72	....	5.79	2.75
Fitchburg & Leominster Street Ry.	....	....	....	3.00
Holyoke Street Ry.	....	....	0.88	....
Mass. Northeastern Street Ry.	....	....	0.50	3.00
Springfield Street Ry.	....	....	7.11	2.15
Union Street Ry.	....	....	1.28	....
Worcester Consolidated Street Ry.	0.46	....	2.56	....
Michigan				
City of Detroit—Department of Street Rys.	16.49	....	15.85	....
Eastern Michigan Rys.	2.34	....	6.24	....
Grand Rapids R.R.	0.04	....	1.91	....
Michigan Electric Ry.	....	....	1.70	....
Muskegon Traction & Lighting Co.	....	....	0.40	....
Twin City Ry. (Benton Harbor)	....	....	11.60	....
Minnesota				
Duluth Street Ry.	0.74	....	1.94	....
Northern States Power Co., St. Cloud	....	....	0.07	....
Twin City Rapid Transit	4.00	....	16.00	....
Mississippi				
Mississippi Power & Light Co.	....	....	0.10	....
Missouri				
East St. Louis Ry.	....	....	1.06	....
Kansas City Public Service Co.	....	....	20.02	....
Springfield Traction Co.	....	....	0.25	....
St. Joseph Ry., Light, Heat & Power Co.	....	....	2.00	....
St. Louis Public Service Co.	2.85	....	10.72	2.35
Montana				
Butte, Anaconda & Pacific Ry.	0.28	....	....	....
Great Falls Street Ry.	1.00	....	1.51	....
Nebraska				
Omaha & Council Bluffs Street Ry.	0.19	....	3.20	....
New Hampshire				
Manchester Street Ry.	....	....	6.19	....
New Jersey				
Atlantic City & Shore R.R.	....	....	0.33	....
Five Mile Beach Ry.	....	....	4.20	....
Public Service Coordinated Transport	3.54	....	35.13	....
New York				
Binghamton Ry.	....	....	1.24	....
Black River Traction Co.	....	....	0.27	....
Brooklyn City R.R.	0.02	....	7.58	....
Brooklyn-Manhattan Transit Corp.	....	....	18.94	....
City of New York—Board of Transportation	36.84	....	....	....
Eastern New York Utilities Corp.	....	....	0.11	....
Elmira Water, Light & R.R. Co.	....	....	3.15	....
Fishkill Electric R.R.	....	....	....	7.23
Fonda, Johnstown & Gloversville R.R.	....	....	0.66	....
International Ry.	....	....	6.71	....
Jamaica Cnetral Rys.	....	....	2.94	....
Jamestown Street Ry.	....	....	1.89	....
Jamestown, Westfield & Northwestern R.R.	....	....	....	32.50
New York & Queens County Ry.	0.37	....	1.75	....
New York Rys.	....	....	2.65	....
New York State Rys. (Rochester)	....	....	2.07	....
New York State Rys. (Syracuse)	....	....	1.27	....
New York State Rys. (Utica)	....	....	2.30	....
New York, Westchester & Boston Ry.	....	3.68	....	....
Niagara Junction Ry.	0.90	....	....	....
Richmond Rys.	....	....	0.20	....
Rochester, Lockport & Buffalo Railroad Corp.	....	....	....	0.20
Schenectady Ry.	0.24	....	0.18	....
Southern New York Ry.	....	0.20	....	....
Third Avenue Ry.	....	....	14.50	....
United Traction Co.	....	....	1.18	....
North Carolina				
Tide Water Power Co.	....	0.14	....	....
Ohio				
Cincinnati, Hamilton & Dayton Ry.	....	0.66	....	3.00
Cincinnati, Newport & Covington Ry.	0.23	....	1.14	....
Cincinnati Street Ry.	2.62	....	20.77	....
City of Ashtabula Div. of St. Ry.	....	....	2.00	....
Cleveland Ry.	3.80	0.60	10.33	....
Cleveland Southwestern Ry. & Light Co.	....	....	....	7.20
Community Traction Co.	0.08	....	4.36	....
Indiana, Columbus & Eastern Traction Co.	....	....	....	1.00
Northern Ohio Power & Light Co.	0.36	0.03	2.11	2.44
Stark Electric R.R.	....	0.70	1.00	....
Steubenville, East Liverpool & Beaver Valley Traction Co.	....	....	1.50	....
Toledo, Bowling Green & Southern Traction Co.	....	....	....	2.50
Toledo & Western Ry.	....	0.20	....	1.00
West End Traction Co.	....	....	0.65	....
Youngstown Municipal Ry.	....	....	0.17	....

Table I—Track Extension and Reconstruction in 1928—(Continued)

Name of Company	Extension, Miles: City	Extension, Miles: Interurban	Rebuilt, Miles: City	Rebuilt, Miles: Interurban
Oklahoma				
Muskogee Electric Traction Co.	....	0.24	....	....
Northeast Oklahoma R.R.	....	0.35	....	....
Oklahoma Ry.	....	....	10.77	....
Pittsburgh County Ry.	....	0.09	....	....
Tulsa Street Ry.	....	....	1.20	....
Oregon				
Portland Electric Power Co.	0.55	0.31	0.63	0.41
Pennsylvania				
Altoona & Logan Valley Electric Ry.	....	....	1.70	....
City of Philadelphia Division of Transportation	20.86	....	....	....
Philadelphia Rapid Transit Company	4.78	....	19.93	0.48
Conestoga Traction Company	....	....	0.43	1.41
East Penn Traction Co.	....	....	2.00	....
Erie Rys.	0.20	....	0.40	....
Harrisburg Rys.	....	....	2.20	....
Hershey Transit Co.	....	....	....	1.53
Lehigh Valley Transit Co.	....	0.78	2.08	0.02
New Castle Electric Street Ry.	1.80	....	0.60	....
Philadelphia & West Chester Traction Co.	....	....	....	8.00
Pittsburgh Rys.	2.76	0.75	34.48	5.16
Pottstown Transit Co.	....	....	....	1.25
Reading Transit Co.	0.25	....	2.60	....
Scranton Ry.	0.21	....	2.22	....
Shamokin & Mt. Carmel Transit Co.	....	....	14.00	....
Shenango Valley Traction Co.	0.19	....	....	....
Tarentum, Brackenridge & Butler Street Ry.	....	....	0.33	....
West Penn Rys.	....	0.32	1.91	3.97
Wilkes-Barre Ry.	0.50	....	0.56	0.50
Williamsport Rys.	....	....	0.59	....
York Rys.	....	....	0.98	1.10
Rhode Island				
United Electric Rys.	0.70	....	7.42	....
South Carolina				
South Carolina Power Co.	....	....	2.34	....
Tennessee				
Knoxville Power & Light Co.	....	....	2.38	....
Memphis St. Ry.	2.72	....	4.70	....
Nashville Ry. & Light Co.	....	....	3.70	....
Tennessee Electric Power Co.	....	....	0.50	....
Texas				
Dallas Railway & Terminal Co.	0.19	....	5.86	....
Eastern Texas Electric Co.	....	....	6.73	....
Galveston Electric Co.	....	....	2.47	....
Houston Electric Co.	0.20	....	0.87	....
Houston North Shore Ry.	....	1.38	....	....
Laredo Electric & Ry. Co.	0.43	....	0.43	....
Northern Texas Traction Co.	0.70	....	5.49	0.04
San Antonio Public Service Co.	....	....	1.22	....
Texas Electric Ry.	....	3.50	....	....
Utah				
Utah Light & Traction Co.	1.66	....	6.95	....
Virginia				
Danville Traction & Power Co.	....	....	0.84	....
Roanoke Railway & Electric Co.	....	....	2.40	....
Virginia Electric & Power Co.	6.88	....	9.17	....
Virginia Public Service Co.	....	....	0.23	....
Virginia Ry., Norfolk	....	1.44	....	....
Washington				
Gray's Harbor Ry.	....	....	0.08	....
Seattle Municipal Street Ry.	1.35	....	3.42	....
Spokane United Rys.	0.41	....	2.21	....
Tacoma Ry. & Power Co.	....	....	0.91	....
Yakima Valley Transportation Co.	....	....	1.01	....
West Virginia				
Charleston Interurban R.R.	....	0.57	0.76	....
Monongahela, West Penn Public Service Co.	0.04	....	1.62	....
Wheeling Public Service Co.	....	....	0.33	....
Wheeling Traction System	....	....	....	8.50
Wisconsin				
Madison Rys.	....	....	0.75	....
Milwaukee Electric Ry. & Light Co.	5.54	15.68	10.47	4.67
Northern States Power Co.	....	....	1.86	....
Wisconsin Power & Light Co.	....	....	....	2.00
Wisconsin Valley Electric Co.	....	....	0.19	....
Canada				
Brandon, Municipal & Electric Street Ry.	....	....	5.00	....
British Columbia Electric Ry.	....	0.62	2.35	....
Calgary Municipal Ry.	0.57	....	0.28	....
Cape Breton Electric Co.	....	....	2.00	....
Edmonton Street Ry.	....	....	1.04	....
Fort William Electric Ry.	0.08	....	....	....
Hydro Electric Rys. Toronto	3.41	....	1.57	....
Levis Tramways Co.	....	....	....	1.00
London & Port Stanley Ry.	....	2.00	....	....
Montreal & Southern Counties Ry.	....	0.11	0.09	....
Montreal Tramways Co.	8.82	....	12.92	2.03
Moose Jaw Electric Ry.	....	....	1.37	....
New Brunswock Power Co.	....	....	0.60	....
Niagara, St. Catherine & Toronto Ry.	....	0.13	....	0.32
Oshawa Ry.	....	....	0.28	....
Ottawa Electric Ry.	....	....	1.57	....
Quebec Ry., Light & Power Co.	....	....	1.44	....
Regina Municipal Ry.	0.15	....	....	....
Saskatoon Municipal Ry.	1.00	....	....	....
Three Rivers Traction Co.	....	....	0.66	....
Toronto Transportation Commission	14.59	0.08	3.91	....
Winnipeg Electric Co.	1.21	....	1.60	....
Porto Rico				
Porto Rico Ry., Light & Power Co.	....	....	....	1.00
Hawaii				
Honolulu Rapid Transit Co.	....	....	0.95	....

proximately 700 miles of city track was rebuilt. About 220 miles of interurban track was reconstructed, which is approximately the same as reported for the two preceding years. Fifty-three companies rebuilt interurban track last year as compared with 67 in 1927 and 63 in 1926.

In track rebuilt during the year, the largest construction by any single company was that by the Chicago Surface Lines, as this company rebuilt 34.88 miles of track during the year. It was closely followed, however, by the Pittsburgh Railways which reconstructed 34.48 miles during the year. The Cincinnati Street Railway was third with 20.77 miles of track rebuilt, and closely following this was the Kansas City Public Service Company with 20.02 miles of track rebuilt and the Philadelphia Rapid Transit Company with 19.93 miles of track rebuilt. Other comparatively large track rebuilding programs were conducted by the Brooklyn-Manhattan Transit Company, the Phoenix Street Railway, the Twin-City Rapid Transit Company and the Detroit Department of Street Railways, all of which constructed over 15 miles of track. Among interurban track rebuilt the Pacific Electric was considerably in advance of all other railways in that it rebuilt 33.87 miles of track in 1928.

Electrification of steam railroads continued steadily during the past year. The mileage of new electrification projects exceeded by a substantial margin the figures for any other recent year. This subject is discussed in another article appearing elsewhere in this issue.

Entire abandonments were numerous during 1928. Twenty-seven companies completely abandoned 585.72 miles of track. The large increase in entire abandonments is apparently due to a general housecleaning of railways, which have for the last several years been on the verge of abandoning their systems. A glance at the

Entire Electric Railway Properties Abandoned in 1928

Name of Company	Miles of Track
Bangor & Portland Transit Co., E. Bangor, Pa.	8.75
Boise Valley Traction Company, Boise, Idaho	83.20
* Citizens Traction Company, Oil City, Pa.	28.68
* City Electric Company, Albuquerque, N. M.	7.25
Duquesne & Dravosburg Street Railway, Duquesne, Pa.	4.00
Fairchance & Smithfield Traction Co., Uniontown, Pa.	2.75
* Grand Rapids, Gr. Haven & Muskegon Ry., Grand Rapids, Mich.	44.37
* Groton & Stonington Traction Co., Norwich, Conn.	21.77
* Hudson Valley Railway, Glens Falls, N. Y.	114.00
Las Vegas Transit Co., E. Las Vegas, N. M.	3.70
Lebanon-Thorntown Traction Co., Lebanon, Ind.	10.00
* Lewisburg, Milton & Watsontown Pass. Ry., Milton, Pa.	20.00
Lincoln Water & Light Company, Lincoln, Ill.	5.10
Lookout Mountain Railway, Chattanooga, Tenn.	10.80
Memphis & Lake View Ry., Memphis, Tenn.	11.13
* Menominee & Marinette Light & Traction Co., Menominee, Mich.	19.12
Murphysboro & Southern Ill. Ry., Murphysboro, Ill.	8.64
* New York & Stamford Ry., Port Chester, N. Y.	35.49
Northwestern Elec. Service Co. of Pa., Erie, Pa.	56.05
Norton, Taunton & Attleboro St. Ry., Norton, Mass.	21.20
* Plymouth & Brockton Street Railway, Plymouth, Mass.	9.30
* Point Shirley Street Railway, Winthrop, Mass.	1.20
St. Paul Southern Electric Ry., St. Paul, Minn.	17.54
Sandusky, Milan & Norwalk Electric Railway, Sandusky, Ohio.	12.50
Somerset Traction Co., Skowhegan, Maine	12.68
* Stroudsburg Traction Co., Stroudsburg, Pa.	12.50
Westmoreland Railroad, Houston, Tex.	4.00
	585.72

* Now operating buses.

Table II—Partial Track Abandonments in 1928

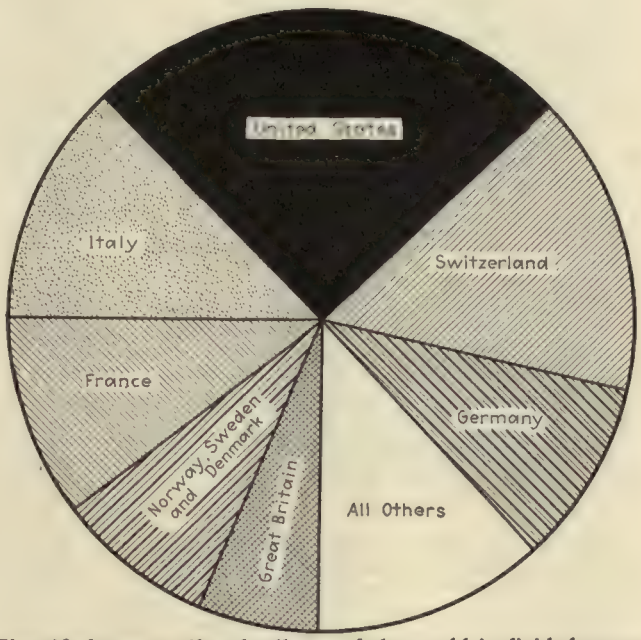
	Miles of Track Abandoned	Type of Service
Alabama		
Birmingham Electric Co	1.47	Interurban
Arizona		
Warren Co	3.25	City
	3.25	Interurban
Arkansas		
Fort Smith Light & Traction Co	10.00	City
California		
Key System Transit Co	6.43	City
Market St. Ry	0.61	City
Pacific Electric Ry	11.92	City
	0.09	Interurban
San Diego Electric Ry	0.92	City
Canada		
Montreal Tramways	2.70	City
Moose Jaw Electric Rys	0.38	City
Toronto Transportation Commission	9.03	City
	0.87	Interurb
Colorado		
Denver Tramway	0.54	City
Connecticut		
Connecticut Co	2.85	City
	10.10	Interurban
New Haven & Shore Line Ry	18.00	Interurban
New York and Stamford Ry	33.83	Interurban
Delaware		
Delaware Electric Power Co	0.33	City
	6.11	Interurban
Florida		
Gulf Power Co	0.25	City
Georgia		
Georgia Power Co. (Atlanta)	0.91	City
Illinois		
East St. Louis & Suburban Ry	21.57	Interurban
Illinois Power Co	1.12	City
Kewanee Public Service Co	1.10	City
St. Louis & Alton Ry	0.06	Interurban
Indiana		
Evansville & Ohio Valley Ry	32.00	City
Iowa		
Cedar Rapids & Iowa City Ry	1.00	City
	17.00	Interurban
Interstate Power Co	2.70	City
Iowa Ry. & Light Co	7.00	City
Iowa Southern Utilities Co. (Burlington)	4.00	City
Keokuk Electric Co	5.40	City
	6.90	Interurban
Waterloo, Cedar Falls & Northern Ry	0.63	Interurban
Kansas		
Joplin & Pittsburg Ry	2.25	City
	6.22	Interurban
Kentucky		
Kentucky Utilities Co	1.00	City
Louisville & Interurban R.R	0.78	Interurban
Louisville Ry	1.08	City
Louisiana		
New Orleans Public Service Inc	0.72	City
Maryland		
Potomac Edison Co	3.30	City
	10.50	Interurban
United Rys. & Electric Co	0.51	City
Massachusetts		
Boston Elevated Ry	4.50	City
Eastern Massachusetts Ry	2.74	Interurban
Mass. Northeastern Ry	6.59	Interurban
Middlesex & Boston Street Ry	7.01	Interurban
Milford, Framingham, Hopedale & Uxbridge Street Railway	28.00	Interurban
Springfield Street Ry	1.55	City
	13.19	Interurban
Worcester Consolidated Street Ry	4.40	Interurban
Maine		
Androscoggin & Kennebec Ry	0.74	City
	13.81	Interurban
Central Maine Power Co	0.50	City
Michigan		
City of Detroit (Dept. of Street Rys.)	1.97	City
Minnesota		
Twin City Rapid Transit	0.30	City
Missouri		
St. Joseph Ry., Lt., Ht. & Pr. Co	1.33	City
St. Louis Public Service Co	2.93	City
Montana		
Butte, Anaconda & Pacific Ry	0.60	City
Nebraska		
Omaha, Lincoln & Beatrice Ry	7.12	City
New Jersey		
Coast Cities Ry	8.00	City
New York		
Binghamton Ry	0.41	City
Brooklyn-Manhattan Transit Corp	2.36	City
Empire State R.R	5.70	City
Fonda, Johnstown & Gloversville R.R	2.08	City
Interborough Rapid Transit	0.10	City
International Ry	0.29	City
New York & Queens County Ry	1.16	City
New York Rys	0.22	City
New York State Rys. (Syracuse)	0.22	City
Niagara Junction Ry	0.27	City
Poughkeepsie & Wappingers Falls Ry	3.98	City
	7.60	Interurban
Syracuse & Eastern R.R	0.09	City
United Traction Co	0.15	City
Ohio		
Cincinnati, Newport & Covington Ry	0.20	City
Cleveland Ry	4.20	City
	1.77	Interurban
Cleveland Southwestern Ry. & Light Co	6.10	City
Community Traction Co	7.20	City
East End Traction Co	0.19	Interurban
Indiana, Columbus & Eastern Traction Co	8.00	Interurban
Northern Ohio Power & Light Co	2.44	Interurban
Shenango Valley Traction Co	0.01	City
West End Traction Co	0.01	City
Oklahoma		
Northeast Oklahoma R.R	0.31	Interurban
Oklahoma Union Ry	10.00	Interburan
Oregon		
Oregon Electric Ry	2.31	Interurban
Pennsylvania		
Conestoga Traction Company	0.31	Interurban
East Penn Traction Co	1.70	Interurban
Erie Rys	3.39	City
Lehigh Valley Transit Co	0.81	City
Monongahela, West Penn Public Service Co	3.00	City
Philadelphia Rapid Transit Co	7.76	City
Pittsburgh Rys	1.28	City
Scranton Ry. Co	0.06	City
West Penn Rys	1.71	City
	2.03	Interurban
Rhode Island		
United Electric Rys	2.13	City
	32.98	Interurban
Tennessee		
Chattanooga Traction Co	4.50	Interurban
Memphis St. Ry	0.05	City
Tennessee Electric Power Co	2.25	City
Texas		
Eastern Texas Electric Co	0.66	City
Houston Electric Co	3.27	City
Northern Texas Traction Co	1.00	City
San Antonio Public Service Co	5.96	City
Wichita Falls Traction Co	0.34	City
Utah		
Utah Light & Traction Co	14.05	City
Virginia		
Virginia Electric & Power Co	6.49	City
Washington		
Seattle Municipal Street Ry	1.12	City
West Virginia		
Wheeling Traction System	0.24	Interurban
Wisconsin		
Milwaukee Electric Ry. & Electric Co	0.66	City
	0.26	Interurban
Wisconsin, Michigan Power Co	15.92	Interurban
Wisconsin Power & Light Co	5.25	City
Wisconsin Public Service Corp	23.83	City
	24.71	Interurban

accompanying table of abandonments will show that a number of these companies were operating through sparsely settled and non-profitable territories. It will be noted that ten of the companies are substituting buses for their former rail service. Partial abandonments for the year totaled 591.07 miles as compared with 432.19 miles of partial abandonments in 1927. The interurban abandonments were approximately 330 miles and the city abandonments about 260 miles. This makes a total of about 1,175 miles abandoned during the year 1928. However, bus route extensions made by electric railways during the year were more than 5,000 miles, making the combined bus and track mileage show a substantial increase for the year.

Notable Progress in

Heavy Electric Traction

United States now has more than 20 per cent of electrified steam railroad mileage of the world. Electrification of more than 1,500 additional miles of track planned by Pennsylvania, Reading and Lackawanna Railroads



Electrified steam railroad mileage of the world is divided among the various countries in the following order: First, United States; second, Switzerland; third, Italy; fourth, France; fifth, Germany; sixth, Norway and Sweden; seventh, Great Britain

RECENT announcement of three large electrification projects involving more than 1,500 miles of track, as well as the actual completion of several similar though smaller projects during the past twelve months, made 1928 a banner year in heavy electric traction progress. Even now the United States, with well over 4,000 miles, leads the world in the extent of this development. Switzerland comes second with approximately 3,280 miles, Italy third with 2,238 miles and France fourth with 2,058 miles. Other countries having extensive electrified systems are Germany 1,500 miles, Norway and Sweden 1,284 miles, and Great Britain 1,019 miles. The total electrified trackage of the world is approximately 19,000 miles, of which about 20 per cent is in this country. Several large projects are contemplated abroad. However, these are hardly comparable in scope with the plans being developed here, and the future undoubtedly will see the United States having an even larger percentage of the world's electrified steam trackage than at present.

The three companies which announced programs for the extensive electrical equipments of important sections of their tracks during 1928 were the Pennsylvania Railroad, Reading Railroad and Delaware, Lackawanna & Western Railroad. Early this year it developed that the New York Central Railroad had recently been conducting power surveys in its territory to determine possible future power needs, but after this fact was published the company declared it had not reached any conclusion yet as to further electrification of its lines between Croton and Buffalo.

Of the three proposed electrifications mentioned, that of the Pennsylvania Railroad is first in importance, when measured by miles of track and investment involved. As outlined by the statement of President Atterbury on Nov. 1, the company is planning to equip for electrical service 325 miles of route and 1,300 miles of track. The authorization by the board of directors includes the lines between New York and North Philadelphia, where the new electric line will connect with an electrical division of the system from Philadelphia to Wilmington, nearly completed, and the main line to the west, which is electrified westward as far as Paoli. The proposed electrification also includes the grades between the Susquehanna, Schuylkill and Delaware River valleys. According to the present plans, the first section to be electrically equipped is the one between North Philadelphia and Trenton. The next section will be between Newark and New Brunswick, and the final section between New Brunswick and Trenton. The section between Newark and New York has been operated electrically since 1910.

No less important than the plan itself is the announcement of the electrical system to be used. The single-phase system at 11,000 volts, similar to that now used on the Philadelphia suburban service, will be employed. The estimated cost to complete the program is $100,000,000, and the time from six to seven years. While nothing has been said in regard to the plans of the company after this installation has been completed, it is obvious that after the electrification of the New York-Washington line as far as Wilmington, its extension to Baltimore and Washington would be an early logical step, especially in view of the uncomfortable conditions for passengers in the tunnels used to pass through Baltimore.

It is also obvious that with the equipment of the main line westward from Paoli, 20 miles west of Philadelphia, to Harrisburg, which is the next logical step, economy of operation would necessitate before long the extension of the electrical division as far as Pittsburgh, since this section includes the Horseshoe curve near Altoona, the limiting point of the line so far as capacity is concerned. Hence the present plans of the Pennsylvania Railroad as

Table I—Installations of Electrical Operation of Steam Railroads in the United States

United States	Electric Mileage		System of Electrification Installed	Number of	
	Route	Track		Locomotives	Motor Cars
Baltimore & Ohio Railroad: Baltimore Tunnel	3.60	7.96	675 volts d.c., third rail	8	.....
Staten Island Rapid Transit Lines	28.00	50.00	600 volts d.c., third rail	.....	90
Boston & Maine Railroad: Hoosac Tunnel, Mass.	7.92	21.38	11,000 volts a.c., 1 phase, overhead	7	.....
Boston, Revere Beach & Lynn: East Boston and Lynn, Mass.	13.12	34.48	600 volts d.c., overhead	.....	60
Butte, Anaconda & Pacific Railway: Butte, Anaconda, Rocker, Mont.	37.38	122.75	2,400 volts d.c., overhead	28	.....
Chicago, Milwaukee, St. Paul & Pacific: Harlowton-Avery, Othello-Tacoma and Seattle	658.77	878.47	3,000 volts d.c., overhead	}	
Great Falls Yard	0.00	6.20	1,500 volts d.c., overhead	57	.....
Gallatin Valley Branch	18.80	25.38	600 volts d.c., overhead	}	
Detroit, Toledo & Ironton R.R.: Fordson, Flat Rock, Mich.	16.58	50.05	22,000 volts a.c., 1 phase, 25 cycle over'd.	2	.....
Erie Railroad: Rochester, Mt. Morris, N. Y.	33.76	36.23	11,000 volts a.c., 1 phase, 23 cycle, over'd	.....	8
Ft. Dodge, Des Moines & Southern: Ft. Dodge, Des Moines, Rockwell, Iowa	147.12	193.95	1,200 volts d.c., overhead	12	13
Great Northern Railway: Cascade Tunnel—Skykomish, Wash.	25.50	31.70	11,000 volts a.c., 1 phase, 25 cycle, over'd	4	.....
Illinois Central R.R.: Chicago, Richton, Ill.	37.80	127.10	1,500 volts d.c., overhead	.....	130
Long Island R.R.: New York to Brooklyn, to western part of Long Island	138.08	424.40	650 volts d.c., third rail	15	742
Michigan Central R.R.: Detroit, Michigan-Windsor, Ontario	4.60	28.55	650 volts d.c., third rail	12	.....
New York Central R.R.: Grand Central Station, Croton, White Plains, N. Y.	63.10	326.24	650 volts d.c., third rail	92	325
N. Y. N. H. & H. R.R.: Nantasket Jc. to Pemberton, Mass.	6.87	16.61	650 volts d.c., third rail & overhead	.....	8
Providence, Warren, Bristol, Fall River	23.91	48.50	650 volts d.c., overhead	.....	24
New York to Woodlawn (a)	.....	.....	650 volts d.c., third rail	b	b
Woodlawn N. Y. to New Haven, Conn. including Harlem River Branch	75.22	509.88	11,000 volts a.c., 1 phase, 25 cycle, over'd	141	63
Stamford to New Canaan, Conn	7.92	9.78	11,000 volts a.c., 1 phase, 25 cycle, over'd	b	b
South Norwalk to Danbury, Conn	23.72	31.01	11,000 volts a.c., 1 phase, 25 cycle, over'd	b	b
Port Morris to Fresh Pond & Sunnyside Yards, New York	9.00	23.80	11,000 volts a.c., 1 phase, 25 cycle, over'd	b	b
N. Y. Westchester & Boston Ry.: Bronx, Harrison, White Plains, New York	26.62	83.10	11,000 volts a.c., 1 phase, 25 cycle, over'd	1	70
Norfolk Southern R.R.: Norfolk, Virginia Beach	44.5	54.3	575 volts, d.c. overhead	2	19
Norfolk & Western Ry.: Bluefield, Iager, W. Va. and Branches	63.70	209.54	11,000 volts a.c., 1 phase, 25 cycle, over'd	16	.....
Northwestern Pacific R.R.: Corte Madera, Sa salito, Cal	20.60	40.4	600 volts, d.c., third rail	.....	44
Pennsylvania R.R.: Camden-Atlantic City, N. J.	75.00	150.38	650 volts d.c., third rail	.....	107
New York, N. Y., Manhattan Transfer, N. J.	13.41	110.08	675 volts d.c., third rail	50	.....
Philadelphia, Paoli, Chestnut Hill, Pa.	36.16	124.65	11,000 volts a.c., 1 phase, 25 cycle, over'd	4	158
Southern Pacific R.R.: Oakland, Alameda, Berkeley, Cal.	50.03	118.28	1,200 volts, d.c. overhead	.....	87
Virginian Railway: Mullens, W. Va.-Roanoke, Va.	134.00	231.00	11,000 volts a.c., 1 phase, 25 cycle, over'd	14	.....
	1,844.79	4,126.15		507	1911

(a) Operates on track of New York Central.
(b) Included in Woodlawn to New Haven.

regards electrification would seem to be the precursor of still more orders for electrical equipment before very long.

Shortly after the announcement of the proposal for the electrical equipment of the lines of the Pennsylvania Railroad, the Reading Railroad declared that it was preparing to expend about $20,000,000 for electrical equipment on all of its lines in the Philadelphia metropolitan district. The route distance to be converted is 42.9 miles, which will include 110 miles of track. As with the Pennsylvania system, single-phase at 11,000 volts with overhead construction will be used. The coaches are to be of the multiple-unit type, and the program is to be completed within three years.

The program of the Delaware, Lackawanna & Western Railroad is small only in comparison with that of the Pennsylvania Railroad. This decision was announced by the president of the company on April 25. It declared that electrical equipment would be used on the Morris & Essex branch and adjoining lines, comprising a total of 78 miles of road, or 173 miles of track. The principal feature in which this undertaking differs from that of the other two plans is that high-voltage direct current will be used. The cost is put at about $18,000,000.

Earlier in 1928 orders for the electrical equipment of the new Cleveland Union Terminal were announced. This installation will involve 16 route miles and will require twenty-five 204-ton passenger locomotives. Direct current at 3,000 volts from an overhead trolley will be used.

Existing Roads Have Extended

The past year has not been one of proposals only. Most of the existing properties have extended their electrified track and increased their electrical equipment. Thus, the Pennsylvania Railroad, during the year, has completed 142 additional miles of electrified track, consisting largely of its line from Wilmington to Philadelphia. The Chicago, Milwaukee, St. Paul & Pacific Railway has opened a 10-mile extension to Seattle, which makes it the longest electrified railroad in the world. The total length of its electrified division is 655 miles. The Great Northern Railway has substituted single-phase for three-phase locomotives for operation in its original Cascade Tunnel and has expanded its electrified section, which now includes 74 miles of main line. The new tunnel which it has constructed through the Cascade range is electrically equipped and is scheduled to go into service today. The Boston, Revere Beach & Lynn Railroad, 34.48 (single track) miles in length, and operating a suburban service between Lynn and Boston, was changed from steam to electrical operation in 1928.

Reports from roads put in operation within the last few years are most encouraging. One of the most instructive, as showing the advantages of electrical operation, is that of the Illinois Central Railroad, relating to its suburban lines extending south from Chicago. Service was begun on this electrification on Aug. 1, 1926, and in a statement given out during the latter part of 1927, President Downs declared that under electrification the Chicago suburban passenger service, which for many years had been operated at a loss, has at last been made to pay its own way. In addition, a byproduct of elec-

Note—The accompanying tables are based on data compiled by the committee on electrification of steam railroads of the National Electric Light Association and the committee on electric rolling stock of the American Railway Association, with data from original sources.

Table II—Installations of Electrical Operation of Steam Railroads Outside the United States

Outside of United States	Electric Route	Mileage Track	System of Electrification Installed	D.C. Locomotives		A.C. Locomotives	
				Number	Aggregate Weight in 1,000 Lb.	Number	Aggregate Weight in 1,000 lb.
Argentina (*a*)	60.55	132.07	800 volts d.c.	2	295		
Australia (*a*)	*233.00*d*	548.10	1,500 volts d.c.	3	325		
Austria	355.33	*425.00*d*	Mostly 15,000 volts a.c. Suburban lines use 750 volts and 550 volts d.c.			154	25,255
Brazil	128.90	*162.00*d*	3,000 volts and 1,500 volts d.c.	43	8,421		
Canada (*b*)	54.70	137.00	3,300 volts single phase, 2,400 volts d.c., and 600 volts d.c.	20	3,356		
Chile	263.04	*388.00*d*	Mostly 3,000 volts d.c. Some lower d.c. voltage	56	10,586		
China (*c*)	25.00	43.00	1,200 volts d.c.				
Cuba (*b*)	163.00	237.50	1,200 volts and 600 volts d.c.				
Czechoslovakia (*b*)	30.50	*45.00*d*	1,500 volts and 700 volts d.c.	17	2,459		
Dutch East Indies (*b*)	31.00	75.00	1,500 volts d.c.	7	1,089		
France (*b*)	769.10	*2,058.00*d*	Mostly 1,500 volts d.c. Suburban line uses 650 volts d.c.	369	63,492		
Germany (*b*)	793.00	*1,500.00*d*	Mostly 15,000 volts single phase, one line 10,000 volts single phase. Berlin and Hamburg suburban lines 800 volts d.c.			409	90,346
Great Britain (*a*)	395.37	1,019.12	Mostly 1,500 volts, 1,200 volts and 600 volts d.c. Two installations of 6,600 volts, single phase	20	2,510		
Holland (*a*)	84.52	169.04	1,500 volts d.c.				
India (*a*)	67.80	170.60	1,500 volts d.c.	43	11,483		
Italy (*b*)	*1,483.00*d*	*2,238.00*d*	10,000 volts, 3,700 volts, 3,300 volts, 3,000 volts, three phase, 4,000 volts, 3,000 volts, 1,200 volts, 650 volts d.c.	27	4,889	524	82,194
Japan (*b*)	198.20	*328.00*d*	1,500 volts, 1,200 volts, 650 volts, 600 volts d.c.	60	8,742		
Mexico	79.54	91.11	3,000 volts d.c. and 600 volts d.c.	10	3,080		
Morocco (*b*)	86.50	*170.00*d*	3,000 volts d.c.	10	1,606		
New Zealand	8.40	13.40	1,500 volts d.c.	5	550		
Norway-Sweden	855.95	*1,284.00*d*	Mostly 15,000 or 16,000 volts single phase, three lines 10,000 single phase, one line 6,000 volts single phase	34	6,590	163	30,223
Spain	38.53	49.72	3,000 volts d.c.				
Switzerland (*b*)	*2,000.00*d*	*3,280.00*d*	Mostly 15,000 volts single phase, some lower a.c. and d.c.			388	81,210
Union of South Africa	171.00	287.00	3,000 volts d.c.	95	14,265		
Venezuela	22.70	30.00	1,500 volts d.c.				
Total	8,398.63	*14,880.66		821	143,738	1,638	309,228

a—Principally motor car operation. *b*—Also considerable motor car operation. *c*—Colliery line. *—Partly estimated.

trification—air rights—may eventually provide a substantial income. Continuing, he said:

"Our suburban patronage is one-third greater than immediately prior to electrification in 1926. This gain has not come so much from other systems of transportation as from the development of the territory served. Large hotels and great apartment buildings have sprung up along the route. Reduction of the smoke and noise of steam operation has made this possible and has helped to enhance residential values. Moreover, the running time of the trains has been reduced by from 11 to 28 per cent, thus bringing the outlying districts closer to the central business district."

Railway Electrification Bound to Expand

There seems to be every reason to expect that railway electrification will expand greatly during the next few years. The primary reason for this is the need for greater carrying capacity on our main trunk lines, and the adoption of electric power is the most economical way of securing this increased capacity.

Electrification has sometimes been thought of as primarily adapted to passenger traffic, perhaps because of its extensive use for commuter service out of New York, Philadelphia and Chicago. For such purpose its smokelessness and rapid rate of acceleration, and hence the high speed possible, make it most attractive. However, it is probable that the limit for speed with main-line steam trains also has not been reached. But it is in the ability with electric power to put more freight over a given track in a given time and thus increase the carrying capacity of an overloaded trunk line that constitutes its greatest advantage to many railroads. Undoubtedly this was one of the principal reasons leading to the decision of the Pennsylvania Railroad, because the official statement declares that with electric power "it is expected eventually to reduce the number of freight trains 50 per cent for a given car movement and to increase the speed to any reasonable degree required. This of itself provides for a 100 per cent increase in capacity in so far as freight movement is concerned."

Of the total miles of line of steam railroad companies in the United States, about 250,000, 10 per cent of this mileage handles 50 per cent of all the traffic, and 50 per cent of the mileage handles 90 per cent of all the traffic. While this statement shows that some lines are lightly loaded, others are very heavily loaded, and on these latter lines the traffic is growing constantly. In spite of the competition of the motor truck, the public is constantly increasing its demands upon the railroads for transportation. Between 1896 and 1906 the ton-miles of the steam railroads doubled from about 1,000,000,000 to 2,000,000,000 and by 1920 they had doubled again to more than 4,000,000,,000. It is not too much to expect that they will shortly double again, and that in the somewhat more distant future they will double again.

Such a situation means that far-seeing railroad managers must think now about ways of providing for the increased carrying capacity that will surely be needed before long on the trunk lines. Some of this increased capacity has been secured in recent years with steam equipment through higher train speeds and greater train lengths, but the limits in these directions with steam seem about to have been attained.

Electrification Gives Large Increase In Track Capacity

An attempt to increase the track capacity by adding to the number of tracks would be almost prohibitive, because of the high cost of real estate and other space limitations in the well-developed areas of the country where most of the increased capacity is needed. Further extension of electrification seems, therefore, almost a foregone conclusion, and the present favorable financial condition of the railroads resulting from a better knowledge by the public of the essential nature of the duties

which they perform should make it more easy for the companies to raise capital for this necessary improvement than it has been in the past.

In certain countries abroad there has been special stimulus for electrical operation which has not been present in this country. Thus in Europe, Italy, Switzerland and Austria are practically devoid of coal yet have plenty of water power. Much the same condition prevails on the northern coast of Africa, particularly in Morocco. This sets a premium on the application of electric power, especially when much of the equipment can be supplied by home manufacture. An additional advantage is that electrification helps the balance of trade by cutting down the imports of coal and supplies work for home electrical industries rather than for foreign coal mines.

Steam Railroad Electrifications During 1928

	Single-Track Miles
Pennsylvania Railroad	142.00
Great Northern Railroad	74.00
Boston, Revere Beach & Lynn Railroad	34.48
Chicago, Milwaukee, St. Paul & Pacific Railroad	10.00
Long Island Railroad	9.00
New York, New Haven & Hartford Railroad	6.66
	267.14

The accompanying Table I shows the electrically operated steam railroad lines in the United States, based on one issued in September, 1928, by the committee on electrification of steam railroads of the National Electric Light Association, with material added from original sources brought up to date. The table is confined to railways formerly operated by steam, except where lines built originally for electric power are integral parts of electrified railroads, as with the New York, Westchester & Boston Railway. Steam railroads, now operated by electricity which are primarily rapid transit lines or are used partly for city transportation, such as the Manhattan Elevated Railway of New York and the electrified division of the West Shore Railroad between Syracuse and Utica, have been omitted.

Table II gives data on electrified steam railroads in foreign countries. The mileage given is based on statistics in the report of the National Electric Light Association, already mentioned, and the figures on locomotives from a recent report of the committee on electric rolling stock of the American Railway Association (Mechanical Division). Where the complete mileage is not given in the N.E.L.A. report it has been obtained from outside sources or has been estimated. The class of roads included in general is the same as that in the American table, except that electrified roads which do both a suburban and a rapid transit business and also serve to carry through trains to their terminii, like Stadt and Vorortbahnen in Berlin and Hamburg, have been included. There are no roads of this kind in the United States.

The difficulties of getting statistics up to a certain date in any industry growing so rapidly as that of railroad electrification are great enough when confined to one country. These difficulties are greatly enhanced when data must be obtained for the entire world. However, Table II gives approximately the data, so far as they are available, up to about the middle of 1928.

As will be noticed, the data on rolling stock in Table II are confined to the number of locomotives and their aggregate tonnage. Only an indication is given as to whether the electrification is principally with locomotives or includes a considerable amount of motor-car operation.

Subway Mileage Increasing

MORE than 284 miles of subway route with 672 miles of track are now in operation in fifteen large cities of the world. Of these New York leads with 261 miles of underground rapid transit track, Paris is second with 117, and London third with 115. No other city is in the same class, the nearest being Berlin with only 43 miles of subway.

Statistics of the underground mileage of electric transit lines in the world, as recently compiled by the Board of Transportation, New York, are given in an accompanying table. This table lists the underground sections of purely rapid transit railways, when within the confines of a city. Where a rapid transit subway is used both by special rapid transit cars or trains and by trolley cars it has been included. An example is the western part of the Market Street subway in Philadelphia. Where a subway is used only by surface cars, like the Tremont Street subway in Boston, or by trunk line trains, though they may do some local business, it has been omitted.

Lines not included but rather closely allied thereto, are:

Hudson & Manhattan Railroad connecting Jersey City, Hoboken, and New York: underground mileage in New York City, 3.147 of route; 7.091 of track; in Jersey City and Hoboken 5.332 of route; 11.017 of track. Tremont Street subway, Boston: 1.698 miles of route; approximately 3.4 miles of track.

Other lines which are a little further differentiated from the type included are as follows: Naples, subway from the main railroad station under the city, and then a trolley extension to Pozzuoli. This line is part of the Government railway system but has local stations in Naples and does quite a little local business; the Park Avenue tunnel of the New York Central Railroad and the East River tunnels used by the Long Island Railroad. The underground mileage of the Metropolitan and Metropolitan District subways in London, over which some suburban as well as subway trains run, is included because their rapid transit business constitutes the greater part of their entire business. Short tunnels which are incidental to trolley car operation, as in Rochester, N. Y., the Park Avenue tunnel used by the surface cars of the New York & Harlem Railroad between 34th Street and 40th Street in New York, and under the Quirinal Hill in Rome, have also been omitted.

UNDERGROUND MILEAGE OF ELECTRIC RAPID TRANSIT LINES OF THE WORLD

	Route-Miles	Tracks	Track-Miles
Barcelona	4.80	2	9.60
Berlin	21.90	2	*43.80
Boston	8.08	2	*16.16
Budapest	2.30	2	*4.60
Buenos Aires	4.50	2	9.00
Glasgow	6.56	2	13.12
Hamburg	5.96	2	*12.00
Liverpool	4.75	2	*9.50
London	56.89	2	*115.00
Madrid	9.13	2	18.26
Paris	58.85	2	*117.70
Philadelphia	8.68	2 & 4	31.74
Sydney	2.88	2	*5.76
Tokio	2.50	2	*5.00
Total for cities other than New York	197.78		411.24
New York			
Elevated Division	†.29	†2	†.58
Contract Nos. 1 and 2	19.56	2, 3, 4	57.74
Contract No. 3	24.73	2, 3, 4	79.80
Total I. R. T.	44.58		138.12
Contract No. 4 (N. Y. R. T.)	41.66	2, 3, 4	123.48
Total New York City	86.24		261.60
Grand total	284.02		672.84

*Approximate.
†Extension of Ninth Ave. Elevated between Jerome and Sedgwick Aves., Bronx.

Substantial Growth in BUS OPERATIONS

Nearly 11,200 buses now in use by electric railways. Approximately 25 per cent were added during past year. Route extensions, including intercity lines, total more than 5,000 miles

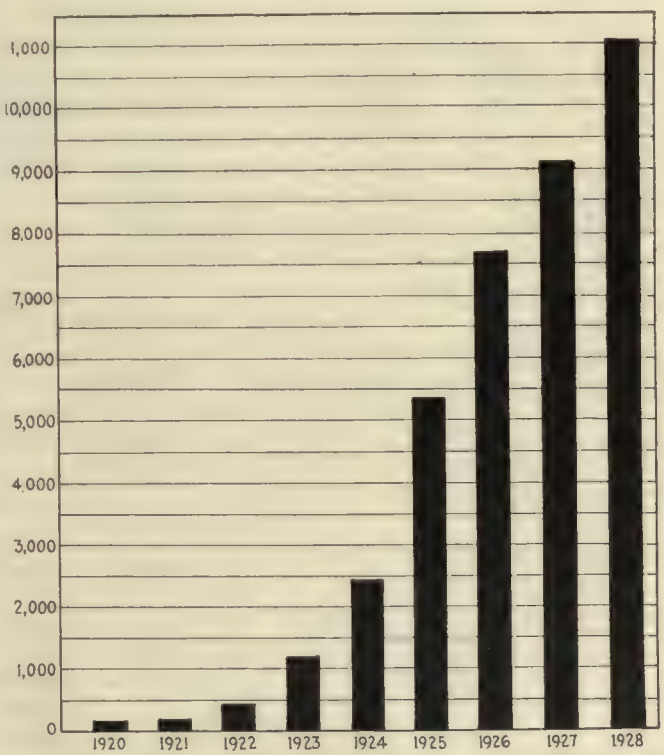
EXPERIENCE extending over a period of several years having demonstrated the value of the bus as an ally, the electric railways of this country and Canada gave evidence of their faith in motor transportation by the purchase during the year just closed of more than 2,450 buses, thereby increasing their equipment by over 25 per cent. The total number of buses now owned by electric railways is nearly 11,200, as compared with 9,229 at the beginning of 1928. Within the past three years the number of buses owned by the industry has more than doubled.

While a number of units taken over with the purchase of former independent lines are included in the additions last year approximately 2,120 of the total represents new vehicles purchased direct from the manufacturer. Companies report that approximately 500 buses were sold, scrapped or otherwise disposed of during the year. Similar surveys conducted by ELECTRIC RAILWAY JOURNAL for 1927 and 1926 showed total purchases of 1,801 and 2,203 buses respectively during those years, the figure in each instance including equipment purchased second hand.

Extensions to bus routes were made in 1928 to an aggregate of some 5,140 miles, of which 1,200 miles were city and 3,940 miles intercity operations. Included in this latter figure are 2,388 miles of intercity service added by the Southern Pacific Company, through its subsidiary, Southern Pacific Motor Transport Company. All told, the electric railways are now operating buses over approximately 23,000 miles of route.

Among the longest intercity extensions were those of the Waterloo, Cedar Falls & Northern, amounting to 157 miles; the Michigan Electric Railway, 132 miles; and the Cedar Rapids & Iowa City Railway 129 miles. Generally speaking, the city extensions were for short distances, but with some of the larger properties the aggregate was considerable. The Public Service Co-ordinated Transport extended its city service for a total of approximately 300 miles, with operations extending over many of the New Jersey cities served by that company. The Illinois Traction System added 105 miles of city service and the Northern Ohio Power & Light Company, 40.4 miles.

There was an abandonment of approximately 1,200 miles of electric railway trackage, city and interurban, during the year, on which the companies suspending service provided bus service over 346 miles of intercity and 112 miles of city route. In certain other instances the abandoned trolley service was replaced by bus service supplied by independent operators. The New York & Stamford Railway, through its subsidiary the County Transportation Company, substituted bus service for trolley service over 33.8 miles of intercity route. The United Electric Railways of Providence, R. I., abandoned some 33 miles of suburban track and substituted bus service. The East St. Louis & Suburban Railway abandoned trolley service on 21.6 miles of interurban route and supplied bus service through its subsidiary, the Blue Goose Motor Coach Company. The Cedar Rapids & Iowa City Railway abandoned trolley service between Cedar Rapids and Lisbon, a distance of 17 miles, and substituted bus service. The Groton & Stonington Railway abandoned trolley service entirely, due to the fact that the trackage and equipment had deteriorated to a point where it was deemed impracticable to replace it, and placed buses in service over 20.77 miles of line between New London, Conn., and Westerly, R. I.



Electric railway buses were increased 26 per cent during 1928

Of the 27 electric railway properties which are listed as having suspended operations entirely during the year, ten have continued as operating organizations, supplying service with buses over some or all of the routes pre-

Table I—Bus Operation by Electric Railways and Subsidiary Companies

	No. Buses Jan. 1, 1929
Alabama	
Birmingham Electric Co.	8
Selma Electric Ry.	5
Arizona	
Tuscon Rapid Transit Co.	4
Warren Co.	6
Arkansas	
Arkansas Power & Light Co.	9
Intercity Terminal Railway	7
California	
Bakersfield & Kern Electric Ry.	5
Eureka Street Ry.	1
Key System Transit Co.	85
Los Angeles Ry.	169
Los Angeles Motor Coach Co.	
Market Street Ry.	6
Municipal Ry. of San Francisco	18
Pacific Electric Ry.	193
Los Angeles Motor Coach Co.	
Pacific Gas & Electric Co.	7
Peninsular Ry.	4
San Diego Electric Ry.	24
San Francisco Napa & Calistoga R.R.	2
Napa Valley Bus Co.	
San Francisco-Sacramento R.R.	1
San Jose Railroads	3
Santa Barbara & Suburban Ry.	7
Southern Pacific Co. (Electric Division)	106
Union Traction Co., Santa Cruz	5
Colorado	
Colorado Springs & Interurban Ry.	5
*Denver & Interurban Motor Co.	11
*Denver & South Platte Transportation Co.	2
Denver Tramway	9
Bus Transportation Co.	
Grand River Valley Ry.	2
Connecticut	
Connecticut Co.	138
*Danbury Power & Transportation Co.	16
*Groton & Stonington Traction Co.	14
*Hartford & Springfield Coach Co.	22
*Lordship Ry.	8
New Haven & Shore Line Ry.	15
Delaware	
Delaware Electric Power Co.	54
Delaware Bus Co.	
District of Columbia	
Capital Traction Co.	34
Washington Ry. & Electric Co.	90
Washington & Old Dominion Ry.	1
Florida	
Jacksonville Traction Co.	4
*Key West Electric Co.	10
Miami Beach Ry.	50
Municipal Ry. of St. Petersburg	8
Tampa Electric Co.	12
Georgia	
Augusta-Aiken Ry. & Electric Co.	1
Columbus Electric & Power Co.	22
Columbus Transportation Co.	
Georgia Power Co.	32
Atlanta Coach Co.	
Savannah Electric & Power Co.	4
Idaho	
*Boise Street Car Co.	6
Illinois	
Aurora, Elgin & Fox River Electric Co.	5
Central Illinois Public Service Co.	9
Chicago, Aurora & Elgin R.R.	10
Chicago & Joliet Electric Ry.	15
Chicago & Joliet Transportation Co.	
Chicago, North Shore & Milwaukee R.R.	64
Metropolitan Motor Coach Co.	
Chicago Surface Lines	8
Chicago & West Towns Ry.	35
East St. Louis & Suburban Ry.	5
Blue Goose Line	27
Red Line	3
East St. Louis Ry. Co.	13
Alton Ry.	5
Evanston Ry.	17
Evanston Bus Co.	
Illinois Power Co.	16
Illinois Power & Light Corp.	135
Illinois Traction System	18
*Joilet, Plainfield & Aurora Transp. Co.	5
Kewanee Public Service Co.	2
Rockford City Traction Co.	27
Rockford & Interurban Ry.	6
Tri-City Ry. of Ill.	6
Indiana	
Beech Grove Traction Corp.	1
Chicago, South Bend & Northern Indiana Ry.	26
Chicago, South Shore & South Bend R.R.	112
Evansville & Ohio Valley Ry.	10
Gary Railways	6
Indianapolis Street Ry.	71
Indianapolis & Southeastern R.R.	4
Indiana Service Corp.	23
Interstate Public Service Co.	32
Northern Indiana Power Co.	3
Southern Indiana Gas & Electric Co.	10
Southern Michigan Ry.	3
Terre Haute, Indianapolis & Eastern Trac. Co.	38
Indiana Motor Transit Co.	
Terre Haute Traction & Light Co.	16
Union Traction Co. of Indiana	51
Iowa	
Cedar Rapids & Iowa City R.R.	14
Clinton, Davenport & Muscatine Ry.	1
Des Moines & Central Iowa R.R.	3
Des Moines City Ry.	8
Des Moines Electric Light Co.	6
Fort Dodge, Des Moines & Southern R.R.	33
Ft. Dodge, Des Moines & South. Transp. Co.	
Interstate Power Co.	10
Iowa Power & Light Co.	4
Iowa Railway & Light Co.	9
Iowa Southern Utilities Co.	
Burlington	20
Centerville	3
Ottumwa	6
Mississippi Valley Electric Co.	4
Waterloo, Cedar Falls & Northern Ry.	11
Tri-City Ry.	9
Kansas	
Arkansas Valley Interurban Ry.	12
Arkansas Valley Transportation Co.	
Kansas City, Leavenworth & Western Ry.	13
Leavenworth Transportation Co.	
Kansas Electric Power Co.	9
Kansas Public Service Co.	2
*Salina Street Ry.	1
Topeka Ry.	35
United Power & Light Corp.	3
Wichita Railroad & Light Co.	50
Wichita Motor Bus Co.	
Kentucky	
Kentucky Traction & Terminal Co.	21
Kentucky Coach Co.	
Kentucky Utilities Co.	10
Louisville Ry.	40
Kentucky Carriers Inc.	
Louisiana	
*Alexandria Municipal Ry.	12
Baton Rouge Electric Co.	3
*Louisiana Elec. Co.	9
New Orleans Public Service, Inc.	37
Maine	
York Utilities Co.	6
Maryland	
Cumberland & Westernport Electric Ry.	10
Cumberland & Westernport Transit Co.	
Potomac Edison Co.	63
Blue Ridge Transportation Co.	
United Rys. & Electric Co.	111
Baltimore Coach Co.	
Washington, Baltimore & Annapolis Elec. R.R.	3
Massachusetts	
Boston Elevated Ry.	303
Boston, Revere Beach & Lynn R.R.	2
Point Shirley Lt. Ry. Co.	
Boston, Worcester & New York Street Ry.	24
Eastern Massachusetts Street Ry.	82
Fitchburg & Leominster Street Ry.	4
*Gardner-Templeton Street Ry.	7
Holyoke Street Ry.	3
Interstate Street Ry.	10
Middlesex & Boston Street Ry.	82
*Milford, Framingham, Hopedale & Uxbridge Street Ry.	4
Milford, Framingham & Uxbridge Coach Co.	
Northampton Street Ry.	1
*Plymouth & Brockton Street Ry.	9
Springfield Street Ry.	50
Union Street Ry.	14
Worcester Consolidated Street Ry.	62
Michigan	
City of Detroit, Department of Street Rys.	529
Eastern Michigan Railways	266
Peoples' Motor Coach Co.	
Wolverine Transit Co.	
*Grand Rapids, Grand Haven & Muskegon Ry.	6
Grand Rapids R.R.	11
Michigan Electric Ry.	44
Southern Michigan Transportation Co.	
Michigan R.R.	15
*Menominee & Marinette Light & Traction Co.	14
Muskegon Traction & Lighting Co.	2
Saginaw Transit Co.	33
Minnesota	
Duluth-Superior Traction Co.	14
Duluth Superior Coach Co.	
Twin City Rapid Transit Co.	102
Twin City Motor Bus Co.	
Mississippi	
Mississippi Power Co.	
(Gulfport Division)	19
(Hattiesburg Division)	7
(Meridian Division)	7
Mississippi Power & Light Co.	
(Jackson Division)	1
(Vicksburg Division)	3
Missouri	
Kansas City, Clay County & St. Joseph Ry.	12
Kansas City, Clay County & St. Joseph Auto Transit Co.	
Kansas City Public Service Co.	76
Missouri Power & Light Co.	2
Springfield Traction Co.	14
St. Joseph Ry., Lt., Ht. & Pwr. Co.	6
St. Louis Electric Terminal Ry.	6
St. Louis Public Service Co.	52
*West Missouri Power Co.	2
Montana	
Butte Electric Ry.	5
Nebraska	
Lincoln Traction Co.	19
Omaha & Council Bluffs Street Ry.	8
New Hampshire	
*Dover, Somersworth & Rochester St. Ry.	6
*Keene Electric Ry.	7
*Laconia Street Ry.	11
Laconia Transit Co.	
Nashua Street Ry.	3
Portsmouth Electric Ry.	12
New Jersey	
Atlantic City & Shore R.R.	11
Central Passenger Ry. Atlantic City	
Coast Cities Ry.	29
*New Jersey Inter-Urban Co.	8
Ocean City Electric R.R.	1
Public Service Co-Ordinated Transport	1781
Trenton & Mercer County Traction Corp.	29
Central Transportation Company.	
New Mexico	
City Electric Co., Albuquerque	1
New York	
Auburn & Syracuse Electric R.R.	8
Mid-State Coach Lines.	
Binghamton Ry.	18
Binghamton Ry. Bus Lines, Inc.	
Black River Traction Co.	15
Watertown Transportation Co.	
Brooklyn City R.R.	4
Buffalo & Erie Ry.	4
Buffalo & Erie Coach Company.	
Cortland County Traction Co.	3
Cortland County Bus Lines.	
Eastern New York Utilities Corp.	3
Eastern New York Transportation Co.	
Empire State Rys.	6
Mid-State Coach Lines	
Fonda, Johnstown & Gloversville R.R.	1
Sacandaga Valley Transit Co.	
*Geneva, Seneca Falls & Auburn R.R.	3
Hamburg Railway	5
*Hudson Valley Ry.	24
Hudson Transportation Co.	
Huntington Traction Co.	4
International Ry.	90
International Bus Corp.	
Jamestown Street Ry.	21
Jamestown Motor Bus Transportation Co.	
Kingston Consolidated R.R.	6
Kingston City Transportation Co.	
*Newburgh Public Service Co.	22
*New York & Stamford Ry.	62
County Transportation Co.	
New York, Westchester & Boston Ry.	8
Soundview Transportation Co.	
New York State Rys. (Rochester)	64
Rochester Interurban Bus Co.	
Rochester Rys. Co-Ord. Bus Lines.	
East Ave. Bus Co.	
Darling Bus Line.	

*No rail operation.

Table I—Bus Operation by Electric Railways and Subsidiary Companies—(Concluded)

	No. Buses Jan. 1, 1929
New York State Rys. (Syracuse)	17
Syracuse Rys. Co-Ord. Bus Line.	
New York State Rys. (Utica)	9
Utica Rys. Co-Ord. Bus Line.	
Niagara Gorge R.R.	6
Niagara Gorge Bus Line	
*Peekskill Lighting & R.R. Corp.	29
Peekskill Motor Bus Corp.	
*Port Jervis Transit Co.	2
Poughkeepsie & Wappingers Falls Ry.	3
Rochester & Syracuse R.R.	1
Mid-State Coach Lines.	
Syracuse & Eastern R.R.	5
Syracuse & Eastern Bus Lines.	
Southern New York Ry.	4
Manson Transportation Co.	
Third Ave. Ry.	170
Surface Transp. Co.	
United Traction Co.	87
Capitol District Transp. Co.	
*Walkill Transit Co.	8
North Carolina	
Carolina Power & Light Co.	1
Durham Public Service Co.	18
North Carolina Public Service Co.	10
Greensboro Bus Co.	
Southern Public Utilities Co.	25
Tidewater Power Co.	2
Coast City Transit Co.	
North Dakota	
Northern States Power Co.	4
Northern Transit Co.	
Ohio	
City of Ashtabula—Division of Street Rys.	3
Cincinnati, Lawrenceburg & Aurora Electric Street Ry.	7
Cincinnati Street Ry.	87
Cleveland Ry.	187
Cleveland, Southwestern Ry. & Light Co.	14
Southwestern Bus Co.	
Coumbus, Delaware & Marion Elec. Co.	2
Columbus Railway, Power & Light Co.	3
Community Traction Co.	124
Dayton Street Ry.	3
Dayton & Xenia Ry.	2
Indiana, Columbus & Eastern Traction Co.	24
Dayton & Columbus Transportation Co.	
Lake Shore Electric Ry.	10
Maumee Valley Co.	13
Maumee Valley Transp. Co.	
Nelsonville-Athens Electric Ry.	1
Nelsonville Transp. Co.	
Northern Ohio Power & Light Co.	261
Ohio Public Service Co.	5
Penn-Ohio Public Service Corp.	115
Portsmouth Public Service Co.	9
Southern Ohio Public Service Co.	33
Columbus & Zanesville Transp. Co.	
Springfield Ry.	1
Steubenville, East Liverpool & Beaver Valley Traction Co.	1
Youngstown Municipal Ry. (see Penn-Ohio System).	
Youngstown & Ohio River R.R.	2
Modern Transit Co.	
Youngstown & Suburban Ry.	13
Youngstown & Suburban Transportation Co.	
Columbiana Bus Co.	
Youngstown Suburban Tourist Lines.	
Oklahoma	
Northeast Oklahoma R.R.	2
Oklahoma Ry.	30
Oklahoma Union Ry.	88
Union Transportation.	
Okmulgee Traction Co.	3
*Shawnee Tecumseh Traction Co.	7
Tulsa Street Ry.	5
Oregon	
Portland Electric Power Co.	42
Pennsylvania	
Altoona & Logan Valley Electric Ry.	18
Logan Valley Bus Co.	
Beaver Valley Traction Co.	9
Beaver Valley Motor Coach Co.	
*Berwick & Nescopeck Street Ry.	2
*Chambersburg & Shippensburg Ry.	6
Cumberland Valley Transp. Co.	
*Citizens Traction Co.	24
Citizens Transit Co.	
Conestoga Traction Co.	4
Conestoga Transp. Co.	
East Penn Traction Co.	8
East Penn Transportation Co.	
Erie Ry.	17
Erie Coach Co.	
Johnstown & Somerset Ry.	1
Johnstown Traction Co.	17
Traction Bus Co.	
Cambria Bus Co.	
Bearerdale Bus Co.	
Lackawanna & Wyoming Valley R.R.	5
Laurel Line Bus Co.	
Lehigh Traction Co.	11
Hazleton Auto Bus Co.	
Lehigh Valley Transit Co.	21
Lehigh Valley Transportation Co.	
Lewiston & Reedsville Electric Ry.	9
Lewiston Transportation Co.	
*Lewisburg, Milton & Watsonville Pass. Ry. Co.	1
*North Branch Bus Co.	9
Northwestern Electric Service Co.	13
Penn Public Motor Transp. Co.	
Philadelphia & Westchester Traction Co.	27
Aaronsmink Transportation Co.	
Philadelphia Rapid Transit	574
Philadelphia Rural Transit Co.	
Penn-Jersey Rapid Transit Co.	
Pittsburgh Rys.	61
Pittsburgh Motor Coach Co.	
Pittsburgh, Mars & Butler Ry. Pittsburgh, Harmony, Butler & New Castle Ry.	8
Harmony Short Line Motor Transport Co.	
Reading Transit Co.	8
Schuylkill Ry.	11
Scranton, Montrose & Binghamton Ry.	2
Scranton Ry.	15
Scranton Bus Co.	
Shamokin & Edgewood Elec. Ry.	9
Shamokin & Treverton Bus Line.	
Shamokin & Mt. Carmel Transportation Co.	3
Ashland & Centralia Auto Bus Co.	
Southern Cambria Ry.	7
Southern Cambria Bus Co.	
*Stroudsburg Traction Co.	3
East Stroudsburg Bus Co.	
*United Traction Street Ry.	2
Dubois Transit Co.	
West Chester Street Ry.	65
Peoples Transp. Co.	
Westmoreland County Ry.	7
Chestnut Ridge Transp. Co.	
West Penn Rys.	26
Penn Bus Lines.	
Westside Electric Rys.	3
Westside Motor Transit Co.	
Wilkes-Barre Ry.	32
Wyoming Valley Autobus Co.	
Williamsport Railways	3
Williamsport Transportation Co.	
Rhode Island	
*Newport & Providence Ry.	30
United Electric Rys.	88
South Carolina	
South Carolina Gas & Electric Co.	8
Spartanburg Bus Co.	
South Dakota	
Sioux Falls Traction System	20
Tennessee	
Nashville Interurban Ry.	9
Interurban Bus Co.	
Nashville Railway & Light Co.	13
Tennessee Electric Power Co.	11
Union Traction Co.	1
Texas	
Abilene Traction Co.	3
Austin Street Ry.	2
Dallas Ry. & Terminal Co.	11
Eastern Texas Electric Co.	20
J. G. Holtzclaw Bus Line.	
El Paso Electric Co.	6
Houston Electric Co.	67
Marshall Traction Co.	3
Northern Texas Traction Co.	10
Nueces Ry.	5
*Rio Grande Valley Traction Co.	5
San Antonio Public Service Co.	74
*Southwestern Transit Co.	4
Texas Electric Ry.	6
Wichita Falls Traction Co.	8
Utah	
Bamberger Electric R.R.	2
Bamberger Transportation.	
Utah Light & Traction Co.	9
Vermont	
Burlington Traction Co.	3
*Twin State Gas & Electric Co.	3
Virginia	
Lynchburg Traction & Light Co.	2
Norfolk Southern R.R.	4
City of Radford	2
Roanoke Railway & Electric Co.	10
Virginia Electric & Power Co.	231
Virginia Public Service Co.	5
Citizen's Rapid Transit Corp.	
Washington	
Grays Harbor Ry. & Light Co.	10
Twin City Transit Co.	
Lewiston-Clarkson Transit Co.	3
Puget Sound Power & Light Co.	107
North Coast Trans. Co.	
Portland-Seattle Stage Co.	
Pacific Northwest Traction Co. (See Puget Sound Power & Light Co.)	
Puget Sound International Ry. & Power Co. (see Puget Sound Power & Light Co.)	
Seattle Municipal St. Ry.	50
Seattle & Rainier Valley Ry.	2
Tacoma Municipal Belt Line	1
Yakima Valley Transportation Co.	3
West Virginia	
Charleston Interurban R.R.	55
Blue & Gray Transit Co.	
Monongahela-West Penn Public Service Co.	51
Monongahela Transport Co.	
Ohio Valley Electric Ry.	32
Ohio Valley Bus Co.	
Tyler Traction Co.	1
Wheeling & Parkersburg Bus Co.	
Wheeling Public Service Co.	4
Bus Transportation Co.	
Wheeling Traction System	13
Ohio Valley Transit Co.	
Wisconsin	
Madison Rys.	9
Milwaukee Electric Ry. & Light Co.	161
Wisconsin Motor Bus Lines.	
Wisconsin Gas & Electric Co.	10
Wisconsin Michigan Power Co.	20
Intercity Bus Company.	
Wisconsin Power & Light Co.	62
Wisconsin Public Service Corp.	34
Wisconsin Valley Electric Co.	8
Valley Transit Co.	
Wyoming	
*Cheyenne Motor Bus Co.	9
Canada	
British Columbia Electric Ry.	22
British Columbia Transit Co.	
Dominion Power & Transmission Co.	40
Grand River Ry.	3
Canadian Pacific Transport Co.	
Hydro-Electric Rys.	18
Levis Tramways	1
London Street Ry.	8
Montreal Tramways	100
Moose Jaw Electric Ry.	3
New Brunswick Power Co.	1
Ottawa Electric Ry.	12
Pictou County Electric Co.	4
Quebec Railway Light & Power Co.	12
Sherbrooke Ry. & Power Co.	7
Toronto Transportation Commission	166
Gray Coach Lines.	
Winnipeg Electric Ry.	48
*Woodstock, Thames Valley & Ingersoll Electric Ry.	1
Hawaii	
Honolulu Rapid Transit Co.	9
Panama	
Panama Electric Co.	2
Porto Rico	
Ponce Electric Co.	4
Total	11,189

*No rail operation.

Table II—Buses Bought by Railways During 1928

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Arizona					
Warren Co.	6	4	Studebaker	Superior	21
		2	Twin Coach	.....	40
Arkansas					
Arkansas Power & Light Co.	4	4	White	Bender	17
California					
Bakersfield & Kern Elec. Ry. Co.	1	1	Graham	Graham	21
Key System Transit Co.	41	40	Twin Coach	Twin Coach	40
		1	A. C. F.	A. C. F.	37
Los Angeles Railway	27	9	White	Bender	29
		3	Fageol	Fageol	29
		11	Twin Coach	Twin Coach	40
		2	Fageol	Fageol	58
		2	Yellow	Yellow	63
Pacific Electric Ry.	30	13	Fageol	Fageol	58
		5	Twin Coach	Twin Coach	40
		6	Yellow	Yellow	63
		*3	Moreland	Moreland	59
		3	Fageol	Fageol	19
Pacific Gas & Elec. Co.	1	1	Yellow	Yellow	21
San Diego Electric Ry.	4	4	Twin Coach	Twin Coach	40
Southern Pacific Co.	61	17	.....	.....	29
		2	.....	.....	28
		2	.....	.....	27
		9	.....	.....	26
		1	.....	.....	25
		11	.....	.....	22
		8	.....	.....	21
		5	.....	.....	17
		2	.....	.....	16
		3	.....	.....	14
		1	.....	.....	11
Colorado					
Denver Tramway	2	2	Mack	Mack	25
Connecticut					
Connecticut Co.	14	5	Mack	Farnham-Nelson	29
		9	Yellow	.....	29
Groton & Stonington Traction Co.	10	10	Twin Coach	Twin Coach	37
Lordship Railway	2	2	Mack	Mack	29
New Haven & Shore Line Ry.	3	*3	A. C. F.	A. C. F.	29
Delaware					
Delaware Electric Power Co.	7	2	Yellow	Yellow	29
		*5	Yellow	Yellow	29
District of Columbia					
Capital Traction Co.	5	3	Yellow	Yellow	21
		2	Yellow	Yellow	29
Washington Railway & Electric Co.	23	6	Yellow	Yellow	21
		8	Yellow	Yellow	29
		5	Yellow	Yellow	21
		*3	Graham	Graham	20
		*1	Yellow	Yellow	21
Florida					
Jacksonville Traction Co.	4	4	Twin Coach	.....	40
Georgia					
Savannah Electric & Power Co.	1	1	Mack	Mack	29
Idaho					
Boise Street Car Co.	2	2	Graham	Graham	21
Illinois					
Alton Ry.	5	*2	Reo	.....	18
		*3	Yellow	.....	21
Blue Goose Motor Coach Co.	5	3	Twin Coach	.....	40
		*2	Yellow	Yellow	21
Chicago & Joliet Electric Ry.	6	5	Yellow	Yellow	29
		1	Mack	Mack	..
Chicago & West Towns Ry.	6	1	Cummings Car & Coach Co.	Cummings Car & Coach Co.	30
		5	Mack	Cummings Car & Coach Co.	29
Chicago Surface Lines	3	3	Twin Coach	Twin Coach	40
Evanston Railway	7	7	Yellow	.....	33
Illinois Power & Light Corp.	32	1	Mack	Mack	29
		5	A.C.F.	A.C.F.	30
		4	A.C.F.	A.C.F.	21
		1	A.C.F.	A.C.F.	27
		11	Yellow	Yellow	21
		6	Yellow	Yellow	29
		4	Yellow	Yellow	17
Illinois Traction System.	10	4	Studebaker	.....	21
		4	A.C.F.	.....	21
		1	A.C.F.	.....	29
		1	Yellow	.....	29
Kewanee Public Service Co.	2	2	Yellow	.....	21
Tri-City Ry. of Illinois.	6	*3	Yellow	Yellow	21
		*1	Mack	Mack	29
		2	Mack	Mack	29
Indiana					
Beech Grove Traction Corp.	1	1	International	Bender	15
Chicago, South Bend & Northern Indiana Ry.	3	3	Studebaker	Superior	21
Chicago, South Shore & South Bend R.R.	2	*2	International	.....	..
Evansville & Ohio Valley Railway	8	8	Yellow	Yellow	17–21
Gary Railways	1	*1	Yellow	Yellow	30
Indiana Service Corp.	7	*4	A.C.F.	.....	31
		*3	Yellow	Yellow	29
Indianapolis & Southeastern R.R.	4	4	Studebaker	.....	22
Interstate Public Service Co.	3	2	Fageol	Fageol	30
		1	A.C.F.	A.C.F.	30
Northern Indiana Power Co.	1	1	International	.....	14
Southern Michigan Ry.	3	3	Studebaker	Superior	21
Union Traction Co. of Indiana	11	9	White	Brown	29
		2	Mack	Mack	29
Iowa					
Cedar Rapids & Iowa City Ry.	9	5	Yellow	Yellow	26
		*2	Yellow	.....	21
		*2	Yell w	Fitzjohn	21
Clinton, Davenport & Muscatine Ry.	1	1	Yellow	Yellow	19
Fort Dodge, Des Moines & Southern R.R.	3	3	Yellow	Yellow	25
Interstate Power Co.	3	3	Mack	Mack	25
Iowa Ry. & Light Co. Marshalltown Div.	7	7	Yellow	Yellow	21
Iowa Southern Utilities Co. (Burlington)	4	4	Mack	Mack	25
Mississippi Valley Electric Co.	2	2	White	.....	25
Tri-City Ry. of Iowa	4	3	Mack	Mack	29
		*1	Yellow	Yellow	29
Waterloo, Cedar Falls & Northern Ry.	3	3	Yellow	Yellow	21
Kansas					
Arkansas Valley Interurban Ry.	1	1	White	White	15
Kansas Public Service Co.	3	3	Graham	Graham	21
United Power & Light Corp.	3	3	Graham	Graham	21
Kentucky					
Kentucky Traction & Terminal Co.	2	2	Yellow	Yellow	21
Louisville Ry.	21	2	Mack	Mack	29
		2	White	Bender	26
		1	White	Bender	29
		14	Studebaker	Superior	21
		2	Studebaker	Superior	14
Louisiana					
New Orleans Public Service, Inc.	7	7	Yellow	St. Louis Car Co.	34
Maine					
York Utilities Co.	1	1	Yellow	.....	..
Maryland					
Cumberland & Western-port Transit Co.	7	4	White	Bender	29
		3	Yellow	Yellow	29
Potomac Edison Co.	12	*1	International	Lang	30
		5	International	Lang	29
		4	Yellow	Yellow	21
		2	White	Lang	25
Massachusetts					
Boston Elevated Ry.	61	1	Safeway	Safeway	29
		1	Mack	International	29
		2	White	Farnham-Nelson	25
		1	White	Brown	29
		11	Twin Coach	Twin Coach	37
		†15	Twin Coach	Twin Coach	35
		†14	Versare	Versare	36
		†16	A.C.F.	A.C.F.	..
Boston, Revere Beach & Lynn R.R.	2	2	A.C.F.	.....	23
Boston, Worcester & N. Y. St. Ry.	2	2	Mack	.....	29
Eastern Massachusetts Street Ry.	15	*4	Mack	Mack	29
		5	Brockway	Brown	21
		6	A.C.F.	A.C.F.	29
Fitchburg & Leominster St. Ry.	4	4	Studebaker	.....	21
Interstate Street Ry.	7	1	A.C.F.	A.C.F.	29
		2	A.C.F.	A.C.F.	27
		*1	Mack	Lang	25
		*3	A.C.F.	Fageol	29
Middlesex & Boston St. Ry.	12	12	White	Bender	29
Milford & Uxbridge Street Ry.	4	4	Mack	Mack	29
Northampton St. Ry.	1	1	Mack	.....	29
Plymouth & Brockton St. Ry.	6	5	Mack	Mack	29
		*1	Reo	.....	20
Springfield Street Ry.	11	3	Yellow	Yellow	29
		2	Yellow	Farnum-Nelson	29
		6	Yellow	Yellow	33
Union Street Ry.	1	1	Yellow	Yellow	29
Worcester Consolidated Street Ry.	24	14	Yellow	Farnham-Nelson	29
		10	Yellow	Yellow	33
Michigan					
City of Detroit—Dept. of Street Rys.	218	1	Graham	Graham	16
		16	Twin Coach	Twin Coach	40
		16	A.C.F.	A.C.F.	40
		†25	A.C.F.	A.C.F.	40
		120	Graham	Graham	15
		40	Yellow	Yellow	16
Eastern Michigan Rys.	48	14	A.C.F.	A.C.F.	29
		4	Yellow	Yellow	17
		20	Yellow	Yellow	17
		10	Twin Coach	Twin Coach	40

*Second-hand. †Gas-electric.

Table II—Buses Bought by Railways During 1928—(Continued)

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Menominee & Marinette Light & Traction Co..	14	10	Reo	Fitzjohn	21
		4	Yellow	Yellow	29
Michigan Electric Ry...	1	1	A.C.F.	A.C.F.	29
Saginaw Transit Co. ...	5	5	Yellow	Yellow	23
Minnesota					
Twin City Rapid Transit Co.....	15	6	Mack	Eckland	29
		7	White	Eckland	29
		2	Wills	Eckland	29
Missouri					
Kansas City Public Service Co.....	7	6	Yellow	Yellow	21
		1	Twin Coach	Twin Coach	40
Springfield Traction Co.	1	1	Yellow	Yellow	23
St. Joseph Ry. Lt., Ht., & Pwr. Co.....	6	6	Yellow	.....	21
St. Louis Public Service Co.....	10	10	Twin Coach	Twin Coach	40
Nebraska					
Lincoln Traction Co....	5	5	Mack	Mack	29
New Hampshire					
Keene Electric Ry.....	1	1	Graham	Graham	20
New Jersey					
Atlantic City & Shore R.R.....	4	4	Yellow	.....	21
Coast Cities Ry. Co.....	4	2	Yellow	Yellow	21
		2	Yellow	Yellow	29
Public Service Co-ordinated Transport....	517	5	White	Bender	21
		†1	White	Bender	29
		†1	Mack	Mack	29
		4	Mack	Mack	29
		†331	Yellow	Public Service	31
		1	Yellow	Yellow	33
		1	Yellow	Yellow	29
		20	Yellow	Yellow	21
		*152	Miscellaneous	Miscellaneous	..
		1	Yellow	Public Service	26
Trenton & Mercer County Traction Co..	2	2	Twin Coach	Twin Coach	40
New York					
Black River Traction Co.	2	2	Reo	Fitzjohn	21
Brooklyn City R.R.....	4	4	White	Bender	29
Hudson Valley Ry.....	24	†24	Mack	Weiner	29
International Ry.....	10	†10	Yellow	.....	33
Jamestown Street Ry...	4	4	Reo	Fitzjohn	21
Kingston Consolidated Railroad.....	1	1	Yellow	Lang	29
Newburgh Public Service	16	16	White	Bender	21
New York & Stamford Ry.....	12	12	Mack	Mack	29
Niagara Gorge R.R.....	4	4	Pierce Arrow	Buffalo Body Corp.	29
Poughkeepsie & Wappingers Falls Ry.....	3	1	A.C.F.	A.C.F.	23
		2	A.C.F.	A.C.F.	29
Syracuse & Eastern Railroad.....	1	1	Reo	Fitzjohn	25
Third Ave. Ry. System.	136	26	Six Wheel	Fitzgibbon	56
		56	Safeway	Fitzgibbon	29
		40	Versare	Versare	37
		14	A. C. F.	A. C. F.	23
United Traction Co. Albany.....	7	7	Versare	Versare	37
North Carolina					
Durham Pub. Serv. Co..	2	2	Yellow	Yellow	21
North Carolina Public Service Co.....	7	2	Graham	Graham	21
		5	Yellow	Yellow	23
Southern Public Utilities Co.....	6	3	Graham	Graham	21
		3	Yellow	Yellow	21
North Dakota					
Northern States Power Co.....	1	1	Reo	Fitzjohn	21
Ohio					
Cincinnati Street Ry....	12	8	Twin Coach	Twin Coach	40
		4	Yellow	Yellow	29
Cleveland Ry.....	21	20	White	Lang	29
		1	Twin Coach	Twin Coach	37
Community Traction Co.	88	3	Mack	Mack	29
		3	White	Bender	29
		1	White	Bender	33
		12	White	Lang	33
		12	Yellow	Yellow	29
		14	Yellow	Yellow	33
		12	Yellow	Lang	33
		10	Twin Coach	Twin Coach	40
		*9	Union	Union	21
		*5	Studebaker	Gibraltar	21
		*5	Reo	Fitzjohn	21
Indiana, Columbus & Eastern Traction Co..	3	3	White	Bender	24
Lake Shore Elec. Ry....	3	3	White	Bender	25
Northern Ohio Power & Light Co.....	64	39	Twin Coach	Twin Coach	40
		10	Yellow	Lang	30
		*6	White	Bender	29
		*1	Pierce Arrow	Brown	29
		*2	Mack	Mack	29
		*1	Yellow	Yellow	29
		*1	Fageol	Fageol	29
		*3	Garford	Garford	17
		*1	Stoughton	Stoughton	20
Ohio Public Service Co..	2	2	Yellow	Yellow	21
Oklahoma					
Oklahoma Ry.....	7	3	Graham	Graham	21
		4	Yellow	Yellow	21
Oklahoma Union Ry....	4	3	Mack	Lang	25
		1	Buick	.....	14
Tulsa Street Ry.....	1	1	Yellow	Yellow	21
Oregon					
Portland Electric Power Co.....	3	3	Twin Coach	Twin Coach	40
Pennsylvania					
Citizens Traction Co....	10	10	A.C.F.	A.C.F.	23
Conestoga Traction Co..	2	2	International	York	25
East Penn Traction Co..	4	3	Mack	Mack	29
		1	Hahn	Hahn	23
Erie Rys.....	9	7	Yellow	Yellow	21
		2	Yellow	Yellow	23
Johnstown Traction Co.	7	7	Yellow	Yellow	29
Lehigh Traction Co.....	1	1	Mack	Mack	29
Lehigh Valley Transit Co.....	1	1	Mack	Mack	29
Lewistown & Reedsville Electric Ry.....	4	4	White	Bender	29
Philadelphia & West Chester Traction Co..	6	3	White	Bender	29
		3	White	Bender	21
Pittsburgh Railways....	24	17	Twin Coach	Twin Coach	35
		4	Yellow	Yellow	29
		3	Yellow	Yellow	17
Reading Transit Co.....	2	1	White	Bender	21
		1	Mack	Mack	29
West Penn Rys.....	34	7	Graham	.....	..
		2	Yellow	Lang	21
		*25	Miscellaneous	.....	..
Wilkes-Barre Ry.....	16	7	Yellow	Yellow	29
		*5	Reo	Reo	21
		*4	Mack	Local	18
Williamsport Rys.....	3	1	Reo	Reo	16
		1	Reo	Reo	18
		1	Reo	Reo	21
Woodlawn & Southern St. Ry.....	1	1	Mack	Mack	29
Rhode Island					
Newport & Providence Ry.....	28	*20	Fageol	.....	29
		*1	White	.....	29
		3	White	Bender	29
		4	Twin Coach	.....	34
United Elec. Rys.....	30	†2	Twin Coach	Twin Coach	40
		28	Twin Coach	Twin Coach	40
South Dakota					
Sioux Falls Traction System.....	2	1	White	Eckland	21
		1	White	Eckland	25
Tennessee					
Tennessee Electric Power Co.....	6	3	Yellow	Yellow	29
		3	Twin Coach	Twin Coach	40
Texas					
Dallas Railway & Terminal Co.....	2	1	Graham	Graham	21
		1	Graham	Graham	16
Eastern Texas Electric Co.....	11	3	Reo	Fitzjohn	21
		*1	Yellow	Yellow	21
		3	Yellow	Yellow	21
		4	Graham	Graham	21
Houston Electric Co....	23	23	Twin Coach	Twin Coach	40
Northern Texas Traction Co.....	1	1	Reo	Reo	21
Nueces Ry.....	3	*2	Reo	.....	22
		*1	Studebaker	.....	22
San Antonio Public Service Co.....	29	15	White	Bender	34
		12	Reo	Fitzjohn	22
		1	Yellow	Yellow	22
		1	Studebaker	Superior	22
Wichita Falls Traction Co.....	4	2	Mack	Mack	25
		2	Mack	Mack	29
Vermont					
Burlington Traction Co.	1	1	Twin Coach	Twin Coach	40
Virginia					
City of Radford, Dept. of Public Utilities....	2	2	Graham	Graham	21
Roanoke Railway & Electric Co.....	3	3	Yellow	Yellow	21
Virginia Electric & Power Co.....	15	15	Twin Coach	Twin Coach	40
Virginia Public Service Co.	1	1	White	Lang	21
Washington					
Grays Harbor Ry. & Light Co.....	2	2	White	.....	29
Lewiston-Clarkston Transit Co.....	2	2	Graham	Graham	21
Puget Sound Power & Light Co.....	19	6	A.C.F.	A.C.F.	29
		6	Yellow	Yellow	29
		2	Yellow	Lang	32
		2	White	Bender	33
		2	Twin Coach	Twin Coach	37
		1	Twin Coach	Twin Coach	40
Seattle Municipal Street Ry.....	17	10	Studebaker	.....	21
		5	Mack	.....	29
		*1	White	.....	29
		*1	White	.....	25
West Virginia					
Charleston Interurban R.R.....	12	6	Yellow	Bender	21
		4	Yellow	Yellow	16
		2	Yellow	Yellow	27

*Second-hand. †Gas-electric.

Table II—Buses Bought by Railways During 1928—(Concluded)

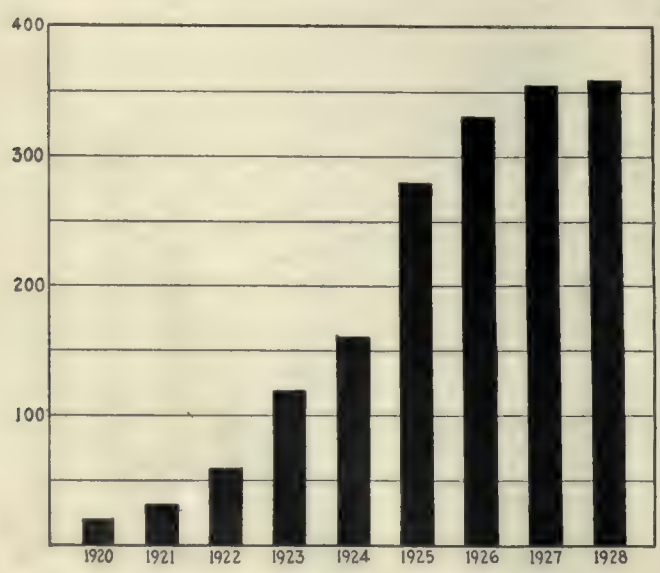
Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Monongahela West Penn Public Service Co.	14	2	Yellow	Yellow	21
		1	Yellow	Yellow	31
		6	Yellow	Lang	21
		4	Graham	Graham	21
		1	Graham	Graham	16
Ohio Valley Electric Ry.	15	5	Yellow	Yellow	21
		10	White	Bender	25
Tyler Traction Co.	1	1	Yellow	Yellow	29
Wheeling Traction Sys.	5	2	Graham	.....	16
		3	Graham	.....	21
Wisconsin					
Milwaukee Electric Ry. & Light Co.	18	1	Twin Coach	Twin Coach	40
		6	Yellow	Yellow	29
		4	Twin Coach	Twin Coach	40
		*2	Packard	Monday	30
		*1	Sterling	Monday	30
		*1	Stegman	Monday	18
		*1	Stoddard	Monday	18
		*1	Studebaker	Monday	18
		*1	Ford	Monday	18
Wisconsin Gas & Electric Co.	2	*2	5th Ave. Coach	.....	29
Wisconsin, Michigan Power Co.	6	4	Twin Coach	Twin Coach	34
		*2	White	.....	26
Wisconsin Power & Light Co.	15	10	A.C.F.	A.C.F.	29
		5	A.C.F.	A.C.F.	22
Wisconsin Public Service Corp.	20	10	Reo	Fitzjohn	21
		5	White	.....	29
		*5	Yellow	.....	29
Wisconsin Valley Electric Co.	1	1	Reo	Fitzjohn	21
Wyoming					
Cheyenne Motor Bus Co.	4	1	Reo	Fitzjohn	21
		3	Studebaker	.....	..
Canada					
British Columbia Electric Ry.	5	4	Yellow	Yellow	29
		1	Yellow	Yellow	23
Dominion Power & Transmission Co.	17	5	Yellow	Yellow	21
		7	Reo	National Steel Car	21
		5	White	Bender	29
Montreal Tramways	12	†2	Versare	Versare	35
		2	Yellow	Yellow	21
		8	Yellow	Yellow	33
Moose Jaw Electric Ry.	3	3	Graham	Graham	21
Pictou County Electric Co.	2	2	International	Local	25
Sherbrooke Railway & Power Co.	2	2	Yellow	Yellow	21
Toronto Transportation Commission	34	2	Mack	Mack	29
		6	Yellow	Yellow	23
		10	Mack	Bender	29
		*1	Reo	.....	18
		*2	Reo	.....	21
		*1	Studebaker	.....	21
		*8	Gotfredson	.....	21–25
		*4	Mack	Mack	25
Winnipeg Electric Co.	17	7	G.M.C.	Local	25
		5	Mack	Local	25
		5	Twin Coach	Cummings Car	40
Honolulu, Hawaii					
Honolulu Rapid Transit Co.	2	2	A.C.F.	A.C.F.	23
Total	2,455				

*Second-hand.
†Gas-electric.

viously served by trolleys. In the majority of instances where abandonments were effected the reasons were purely economic, due to falling off in traffic and revenue or inability to meet heavy paving charges or the expenses of grade separations, highway improvement, or the like.

Thirteen electric railways not previously engaged in bus operation established bus service during 1928. These were all comparatively small installations. The principal extensions of route and purchases of new equipment were made by railways with long-established records as operators of automotive equipment. Several properties which had been providing bus service suspended operation during the year. Several others were absorbed in corporate combinations. Thus by the close of 1928 there were approximately 350 electric railways operating buses.

The largest purchaser during the year was the Public Service Co-ordinated Transport of Newark, N. J., which added a total of 517 buses to its fleet, already the largest in the country. Of the buses purchased 365 were new and 152 were second hand, taken over in the purchase of various independent lines throughout the state of New Jersey. This company scrapped or retired 177 buses from service, leaving a total of 1,781 buses in service at the close of the year.



More than 350 railways now give bus service

The bus of large seating capacity, which was developed during the latter part of 1927, established its position in the industry to the extent that approximately 17 per cent of the new equipment purchased during the year was of this type.

The trend toward the larger type of buses was further emphasized by the fact that of the total number purchased, nearly 1,000 were of the type seating from 29 to 33 passengers, and more than 100 others were of the type seating 25 passengers. A conspicuous order of small capacity buses was that of the Detroit Department of Street Railways, which added to its fleet 161 buses of the type seating 15-16 passengers. These buses are used in a specialized service that has been developed in that city in connection with a co-ordinated express trolley, local bus operation on certain of the long trunk lines.

Nearly 450 gas-electric buses were sold to trolley companies during the year, but the purchases were confined to comparatively few properties. Public Service Co-ordinated Transport bought 333 and the International Railway of Buffalo bought 10, all of the single-deck 29-passenger type. The City of Detroit Department of Street Railways bought 40 large-capacity gas-electrics, and the Boston Elevated Railway 45. The Capitol District Transportation Company of Albany, N. Y., was a purchaser of 7 buses with gas-electric drive. The total number of gas-electric buses sold closely approximates the figure for 1927, which was reported as 438.

It is estimated that there are now approximately 1,900 gas-electric buses in service in this country, of which Public Service Co-ordinated Transport has 900, the Philadelphia Rural Transit, subsidiary of the Philadelphia Rapid Transit, has 560, the Detroit Department of

Table III—Bus Route Extensions During 1928

	City	Intercity
Arizona		
Tucson Rapid Transit	1.50	.....
Warren Co	.....	6.50
California		
Key System Transit Co	10.63	.....
Los Angeles Ry	7.85	.....
Pacific Electric Ry	6.85	6.50
San Diego Electric Ry	1.18	.....
Southern Pacific Co. (Elec. Div.)	1.80	2,388.20
Colorado		
Denver Tramway	7.56	.....
Connecticut		
Connecticut Co	33.38	14.61
Groton & Stonington Traction Co.	.....	20.77
Delaware		
Delaware Electric Power Co	.....	9.60
District of Columbia		
Capital Traction Co	0.57	.....
Washington Railway & Elec. Co.	8.88	29.30
Florida		
Jacksonville Traction Co	5.75	.....
Georgia		
Savannah Electric & Power Co	5.25	.....
Illinois		
Alton Ry. Co	25.00	24.10
Blue Goose Motor Coach Co	.....	43.80
Chicago & Joilet Electric Ry	.....	40.00
Evanston Ry	4.00	.....
Illinois Power Co	2.73	.....
Illinois Traction System	105.50	.....
Kewanee Public Service Co	2.00	.....
Tri-City Ry. of Illinois	.....	4.25
Indiana		
Beech Grove Traction Co	2.00	.....
Gary Rys	1.00	.....
Evansville & Ohio Valley Ry	.....	66.50
Indianapolis & Southeastern R. R.	.....	60.00
Indiana Service Corp	1.50	.....
Iowa		
Cedar Rapids & Iowa City Ry	.....	129.00
Clinton, Davenport & Muscatine Ry	.....	38.22
Interstate Power Co	2.70	.....
Iowa Ry. & Light Co	9.00	.....
Iowa Southern Utilities Co. (Burlington)	2.00	.....
Waterloo, Cedar Falls & Northern Ry	.....	157.00
Kansas		
United Power & Light Corp	8.00	.....
Kentucky		
Kentucky Utilities	2.00	.....
Louisville Ry	8.00	.....
Maryland		
Cumberland & Westernport Transit Co	.....	10.50
Potomac Edison Co	8.40	57.70
Massachusetts		
Boston Revere Beach & Lynn R. R.	1.20	.....
Boston, Worcester & New York Street Ry	11.00	.....
Eastern Massachusetts Street Ry.	9.30	7.00
Interstate Street Ry	2.30	.....
Middlesex & Boston Street Ry	10.15	.....
Milford, Framingham & Uxbridge Coach Co	.....	21.00
Plymouth & Brockton St. Ry	9.00	10.00
Springfield Street Ry	2.55	19.20
Worcester Consolidated St. Ry	9.00	.....
Michigan		
Grand Rapids R.R.	0.25	.....
Michigan Electric Ry	23.65	132.20
Menominee & Marinette Light & Traction Co	13.30	.....
Saginaw Transit Co	22.10	.....
Minnesota		
Duluth Street Ry	5.43	.....
Twin City Rapid Transit Co	1.10	.....
Missouri		
Kansas City Public Service Co	9.60	.....
St. Joseph Ry., Lt., Ht., & Power Co	1.62	.....
St. Louis Public Service Co	5.44	.....
Nebraska		
Lincoln Traction Co	2.00	.....
New Hampshire		
Keene Electric Ry	2.00	.....
New Jersey		
Atlantic City & Shore R.R.	14.00	.....
Coast Cities Ry	5.20	.....
Public Service Coordinated Transport	300.59	.....
New York		
Brooklyn City R. R.	1.40	.....
Buffalo & Erie Ry	30.00	.....
Hudson Valley Ry	21.00	19.00
Jamestown Street Ry	9.50	.....
Newburgh Public Service Co	3.50	.....
Poughkeepsie & Wappinger's Falls Ry	3.98	7.60
Syracuse & Eastern R. R.	2.50	.....
North Carolina		
North Carolina Public Service Co	11.80	.....
Southern Public Utilities Co	2.75	.....
Oklahoma		
Oklahoma Union Ry	.....	74.00
Ohio		
Cincinnati, Lawrenceburg & Aurora Electric Street R. R.	7.50	.....
Cincinnati Street Ry	2.50	5.80
Cleveland Ry	12.10	.....
Community Traction Co	38.18	.....
Northern Ohio Power & Light Co.	40.40	19.40
Ohio Public Service Co	2.50	.....
Pennsylvania-Ohio Public Service Corp	2.10	.....
Oregon		
Portland Electric Power Co	3.08	.....
Pennsylvania		
Citizens Traction Co	16.00	.....
East Penn. Transp. Co	.....	32.00
Erie Rys	6.00	.....
Lewistown & Reedsville Electric Ry	13.70	.....
Monongahela West Penn Public Service Co	3.10	.....
Philadelphia & Westchester Traction Co	.....	43.50
Pittsburgh Rys	8.00	30.00
Reading Transit Co	2.60	.....
Scranton Railway	0.80	.....
West Penn. Rys	.....	45.00
Wilkes-Barre Ry	3.00	11.00
Rhode Island		
United Electric Rys	7.26	47.50
Tennessee		
Tennessee Electric Power Co	25.77	.....
Texas		
Eastern Texas Electric Co	12.94	20.10
Houston Electric Co	21.70	.....
Northern Texas Traction Co.	3.07	.....
Nueces Ry	5.00	.....
San Antonio Public Service Co	37.57	.....
Utah		
Utah Light & Traction Co	1.10	.....
Virginia		
City of Radford Dept. of Public Utilities	6.00	6.00
Roanoke Railway & Electric Co.	1.20	.....
Virginia Electric & Power Co	8.71	.....
Washington		
Lewiston-Clarkston Transit Co.	10.00	.....
Seattle Municipal Street Ry	5.80	.....
West Virginia		
Charleston Interurban R.R.	.....	2.33
Ohio Valley Electric Ry	12.00	35.00
Wheeling Traction System	3.50	.....
Wisconsin		
Milwaukee Elec. Ry. & Light Co.	2.90	.....
Wisconsin Public Service Corp.	12.25	12.20
Wisconsin Power & Light Co	7.55	86.90
Wyoming		
Cheyenne Motor Bus Co	8.00	.....
Canada		
Hydro-Electric Rys	6.00	.....
Montreal Tramways	1.90	.....
Moose Jaw Electric Ry	4.95	.....
Sherbrooke Railway & Power Co., Ltd	2.70	.....
Toronto Transp. Commission	9.10	144.80
Total	1,200.77	3,938.08
Grand Total		5,138.85

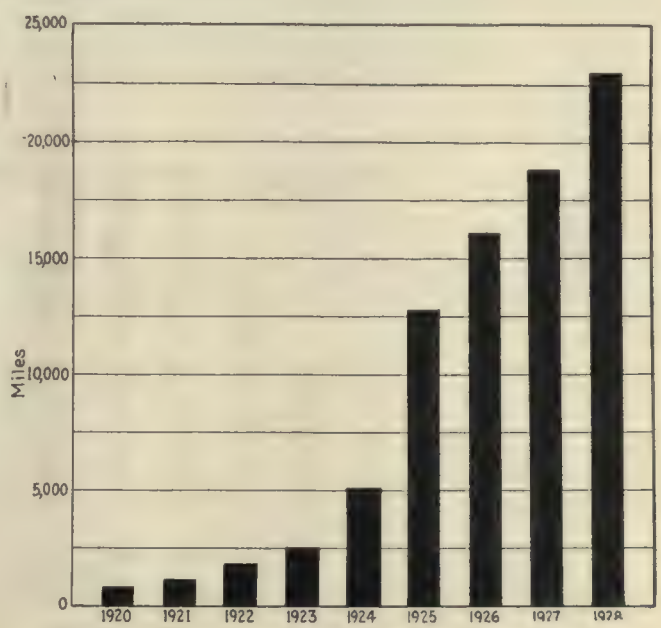
Street Railways, 75, International Railway of Buffalo, 65, and the Boston Elevated, 50.

Twenty-six double-deck buses, seating 56 passengers, were purchased by the Surface Transportation Corporation, subsidiary of the Third Avenue Railway system, New York City. The Los Angeles Railway bought two 58-passenger and two 63-passenger double-deck buses, and the Pacific Electric Company bought six 63-passenger and three 59-passenger double-deck buses, all for local service in the city of Los Angeles.

Canadian companies bought 92 buses during the year, increasing the total number of their vehicles to 443. During the previous year these same properties had purchased 138 buses.

Of the buses acquired by the electric railways some 330 were second-hand vehicles, for the most part taken over in the purchase of independent lines. The majority of these buses are reported to have been junked and replaced by new equipment, but a few were retained in service. All told, the electric railways report having scrapped, traded in, converted or otherwise disposed of nearly 500 buses. In a few cases entire operations were sold outright, as for example, the case wherein the Puget Sound Power & Light Company disposed of 26 of its fleet to an independent operator, but acquired nineteen new buses for service on its remaining lines.

Several electric railway properties have embarked extensively in the sightseeing and charter bus business, among them being the International Railway, of Buffalo; the Louisville Railway, United Railways of Baltimore; Philadelphia Rapid Transit Company, Public Service Co-ordinated Transport, and the Toronto Transportation Commission. This has increased the demand for buses of the de luxe, parlor car type, of which the purchase of a number are recorded.



Electric railways are extending their bus routes rapidly

Passenger Car Purchases in 1928 at Low Level

During last year 601 electric railway passenger cars were ordered for city service; 93 passenger cars for interurban service, and 171 freight and miscellaneous cars. Also, 32 electric locomotives were ordered

ORDERS for electric railway cars and locomotives during 1928 totaled 897. This is the smallest figure for any year since 1907, when ELECTRIC RAILWAY JOURNAL began compiling these statistics. The previous minimum was for 1921, when 1,276 cars and electric locomotives were ordered. Purchases during 1925, 1926 and 1927 also were extremely low, there being less than 2,000 cars ordered each of those years. Although the actual number of cars purchased was comparatively small there have been a number of significant developments in design. Among these has been a decided trend toward de luxe appearance and comfortable interiors for passenger cars. Never before in the history of the industry has so much attention been devoted to improving car appearance and attractiveness as has been evident during the last two years. The various car manufacturers have spent large sums of money in developing improved types of cars and trucks, and several have built experimental cars without orders.

Table I—Number and Types of Cars Purchased During 1928

	United States	Canada	Total
Number of companies reporting purchase of new cars	37	9	46
CITY SERVICE			
One-man cars bodies longer than 28 ft.			
Single truck	6	....	6
Double truck	27	81	108
One-man, two-man cars	232	36	268
Two-man cars (surface)	131	88	219
Service and miscellaneous cars	32	19	51
Total cars for city service	428	224	652
INTERURBAN SERVICE			
One-man, double-truck cars	17	....	17
One-man, two-man cars	....	....	....
Two-man cars	41	....	41
Passenger trailers	20	....	20
Motor cars for train service	15	....	15
Express and freight cars	104	....	104
Miscellaneous cars	16	....	16
Total cars for interurban service	213	....	213
Electric locomotives	31	1	32
Total cars and electric locomotives	672	225	897

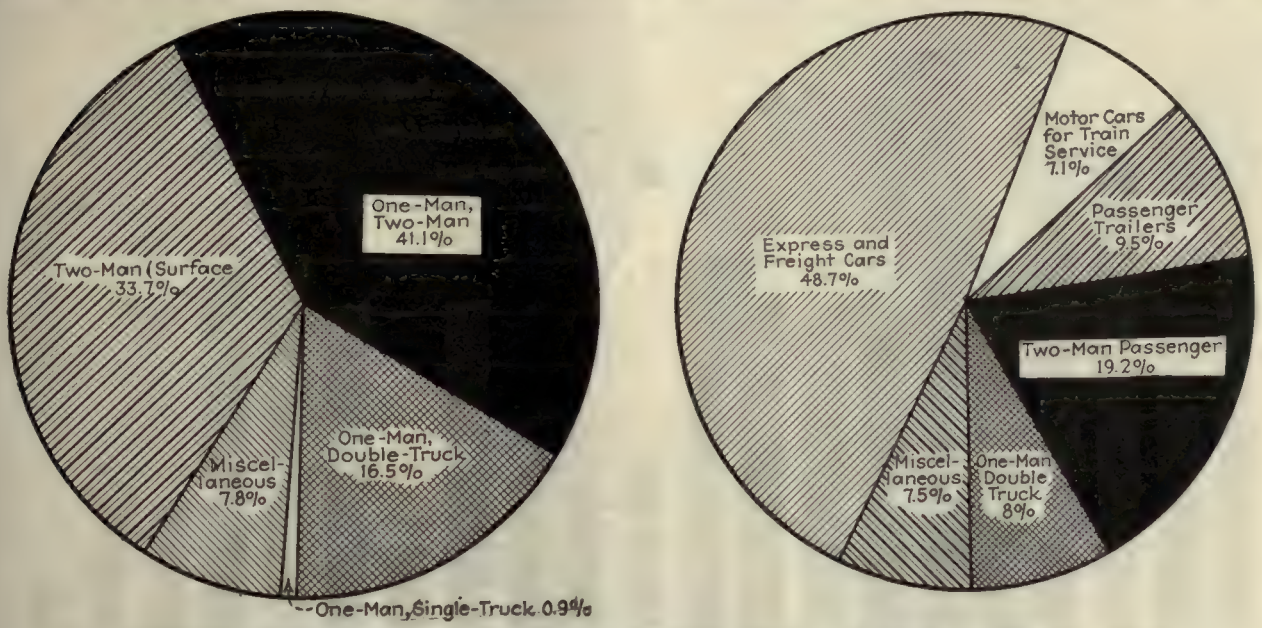
A large number of trucks with worm drives and with double reduction drives have been placed in service on various railways during the year to give these a thorough trial to determine if additional improvements are necessary. Two experimental types of four-wheel cars with extremely long wheelbase have been brought out by manufacturers. Experiments with these cars in service are going forward to determine if they meet the needs for city railways. Equipment manufacturers have shown eagerness to provide improved equipment to meet the requirements of operators. Particular attention has been given to increasing rates of acceleration and braking and making equipment more accessible.

Buying of rolling stock last year was confined to 46 railways sending in returns. Of these 37 were in the United States and 9 in Canada. The number of railways reporting the purchase of new cars during the last five years was 119 in 1924, 94 in 1925, 108 in 1926, 61 in 1927, and 46 in 1928.

Table II—Special Comparison by New Rolling Stock Ordered by Years

	1928	1927	1926	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916
Number of railways reporting new cars	46	61	108	94	119	167	145	94	172	160	140	182	250
CITY SERVICE													
Number of one-man cars (28-ft. body S. T.)	....	.....	66	55	103	312	772	565	1,699	1,383	644	280	187
Number of one-man cars other than 28-ft. body	114	212	144	74	96	183	227	....	....	....	....	....	....
Number of one-man, two-man cars	268	198	574	512	1,224	1,076	471	....	....	....	....	....	....
Number of two-man passenger motor cars*	219	414	456	405	537	1,097	1,290	383	847	635	1,068	1,316	2,731
Number of passenger trailers	....	.....	9	8	25	247	150	111	343	111	130	402	128
Service cars	51	68	52	70	44	121	103	47	104	31	(a)	(a)	(a)
Total cars city service	652	892	1,301	1,124	2,029	3,036	3,013	1,106	2,993	2,160	1,842	1,998	3,046
INTERURBAN SERVICE													
Number of one-man cars	17	31	43	3	61	56	40	....	....	....	....	....	....
Number of one-man, two-man cars	....	8	45	70	18	38	9	....	....	....	....	....	....
Number of two-man motor cars*	56	69	172	207	435	330	122	103	195	96	200	158	303
Number of passenger trailers	10	13	49	40	4	3	16	26	32	32	55	27	71
Number of freight, express and miscellaneous cars	120	295	212	168	1,494	474	302	34	361	141	(a)	(a)	(a)
Total cars interurban service	213	416	521	488	2,032	901	489	163	588	269	255	185	374
Total number of cars	865	1,308	1,822	1,612	4,061	3,937	3,502	1,269	3,581	2,429	2,375	2,406	3,911
Number of electric locomotives	32	40	60	47	31	92	34	7	17	18	44	49	31

* Includes motor and trail cars for subway, elevated and train service. (a) Not available.



The proportion that each type of car bears to the total purchased during 1928 is shown in the above diagrams. The diagram at the left is for city cars and that at the right for interurban cars

Eight railways reported purchases of twenty or more passenger cars, six of which are city properties and two interurbans. These eight railways purchased a total of 556 cars or nearly 65 per cent of all the cars purchased. The largest order placed during 1928 was that of the Montreal Tramways, which included 86 double-truck, two-man cars, 65 double-truck, one-man cars, 2 articulated passenger cars, 2 snow plows, 4 sweepers, 4 dump cars and 1 work car. In the United States two railways purchased 100 or more cars each. The Cincinnati Street Railway bought 104 double-truck, one-man, two-man cars, and the Department of Street Railways, Detroit, Mich., 100 double-truck, one-man, two-man cars. The Cleveland Railway was the next largest purchaser, this company having bought 50 double-truck, two-man cars, 28 articulated units, and 18 dump cars. Of the other railways reporting purchases of more than 20 cars, Market Street Railway built 26 double-truck, two-man cars; the Quebec Railway, Light & Power Company bought 20 double-truck, one-man, two-man cars, 2 snow plows, 1 sprinkler car and 1 work car; the Chicago, South Shore & South Bend Railway, 15 two-man cars for interurban service, 5 trailers and 2 cabooses; and the Illinois Central Railroad, 10 motor cars and 10 trailers for interurban service.

It will be noted that two of the large orders for cars to be used in city service included articulated units. The Cleveland Railway's type of articulated car is 101 ft. long, weighs 38 tons and seats 100 passengers, while the type adopted by the Montreal Tramways is 80 ft. long, weighs 29½ tons and seats 90 passengers.

Statistics given in the accompanying tables of rolling stock were obtained from replies to questionnaires sent to all electric railways in the United States and Canada. Replies were received from companies representing more than 96 per cent of the total track mileage. Through the co-operation of the manufacturers, lists of cars built by them during the year were furnished so that the replies received from railways could be checked very carefully. In a few cases where replies were not received from electric railways themselves, the information furnished by the car manufacturers has been used. Replies were received from all car manufacturers. In addition to the information obtained from these two sources, the files of ELECTRIC RAILWAY JOURNAL have been used extensively. Particular care has been used to verify figures which appeared doubtful and it is believed that the final data are complete and accurate.

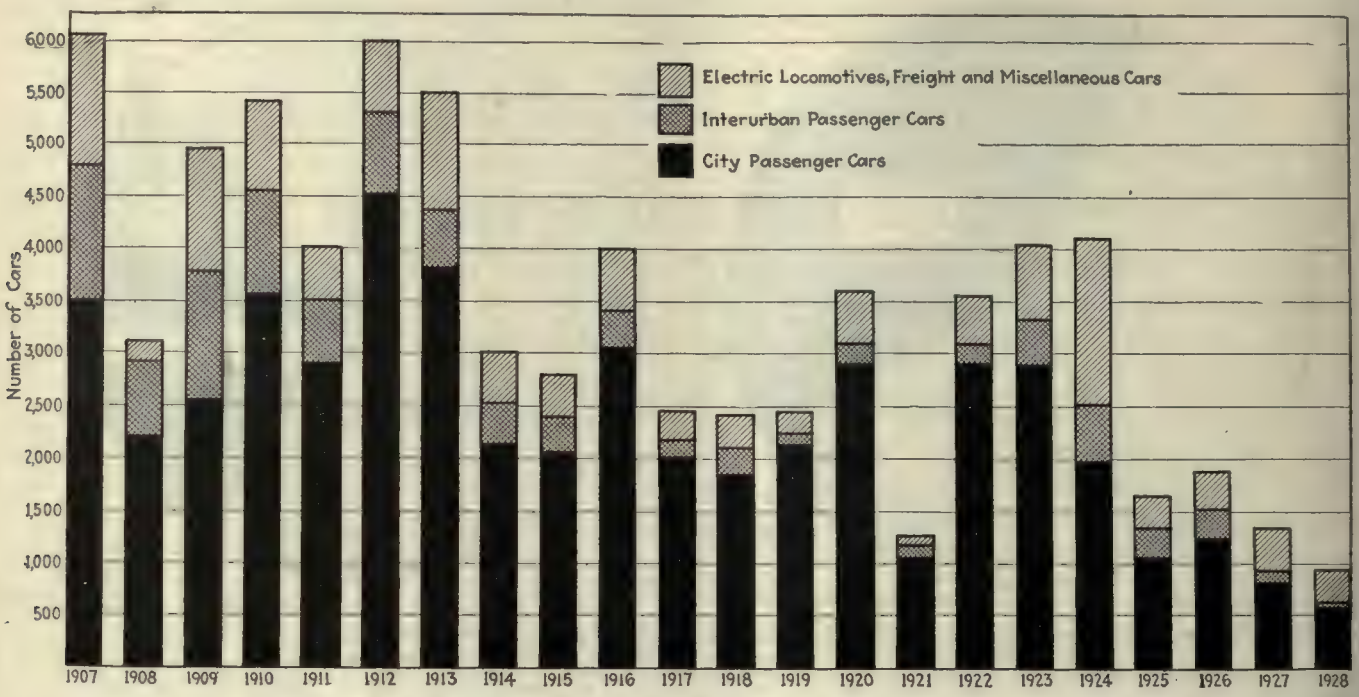
Analysis of the reports received on new rolling stock shows that the only types of cars of which there were

Table III—Railways Purchasing 20 or More Passenger Cars

Montreal Tramways	86	City double truck, 2 man
	65	City, double truck, 1 man
	2	City, three truck, articulated units
	2	Snow plows
	4	Sweepers
	4	Dump cars
	1	Work car
Cincinnati Street Railway	104	City, double truck, 1-2 man
Department of Street Railways, Detroit	100	City, double truck, 1-2 man
Cleveland Railway	50	City, double truck, 2 man
	28	City, three truck articulated units
	18	Dump cars
Market Street Railway	26	City, double truck, 2 man
Quebec Railway, Light & Power Co.	20	City, double truck, 1-2 man
	2	Snow plows
	1	Sprinkler car
	1	Work car
Chicago, South Shore & South Bend Railroad	15	Interurban, double truck, 2 man
	5	Interurban trailers
	2	Cabooses
Illinois Central Railroad	10	Interurban motor cars
	10	Interurban trailers

Table IV—Electric Locomotives Ordered in 1928

Railway	No.	Weight Tons	Length Over All Ft 'n
Alabama Power Co.	1	35.00	.....
Chicago, South Shore & South Bend R.R.	2	80.00	.....
Cincinnati, Hamilton & Dayton Ry.	1	43.50	49—0
Great Northern Ry.	1	307.50	94—4
Illinois Central R.R.	1	105.00	41 0
Illinois Traction System	4	80.00	40—0
Midland Utilities Co.	2	81.25	39—4
New York Central R.R.	5	30.00	.....
New York State Rys. (Rochester)	1	50.00	37—0¼
Niagara Junction Ry.	1	60.00	35—0
Oklahoma Ry.	3	60.00	.....
Oshawa Ry.	1	55.00	32—0
Piedmont & Northern Ry.	1	90.00	.....
Sacramento Northern Ry.	2	62.70	.....
Sand Springs Ry.	1	50.00	35—6
Springfield Suburban R.R.	1	37.50	33—0
Texas Electric Ry.	2	50.00	36—6
Toledo & Western Ry.	1	50.00	35—5¾
Waterloo, Cedar Falls & Northern Ry.	1	48.25	35—5
Total	32		



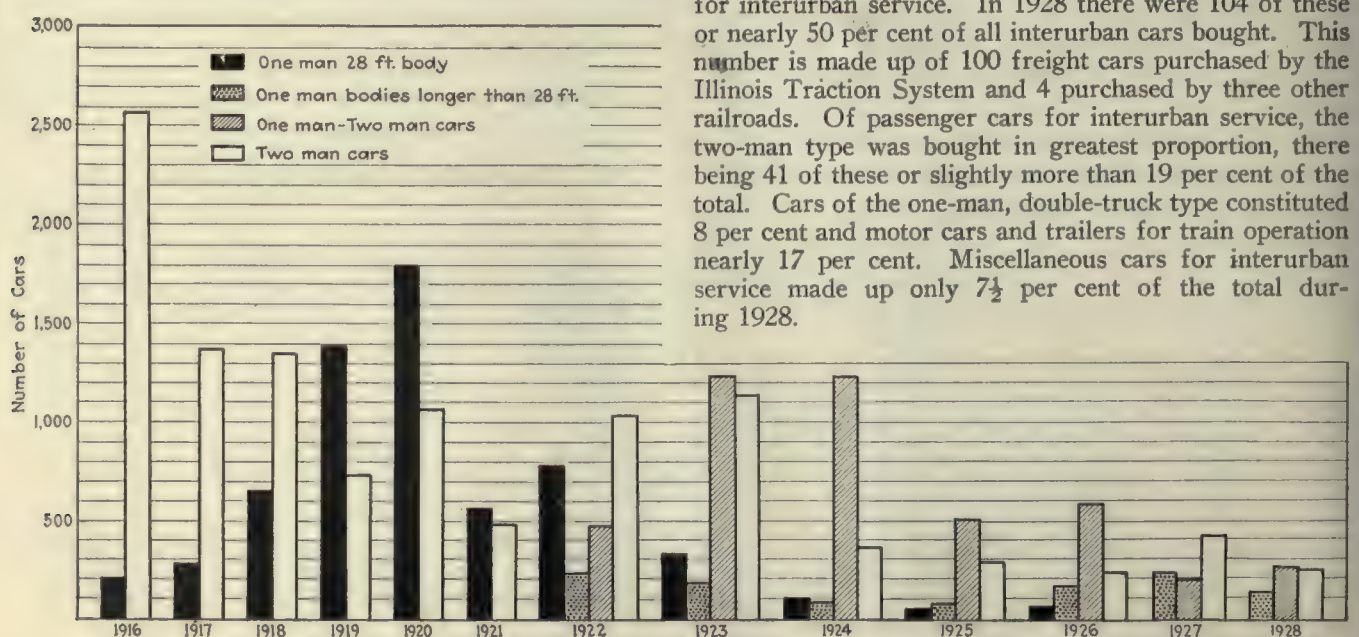
Analysis of city and interurban passenger cars and total cars and electric locomotives purchased during the past 22 years

increased purchases during 1928 over 1927 were one-man, two-man cars for city service and passenger trailers for interurban service. There were 268 one-man, two-man cars purchased in 1928 for city service as compared with 198 in 1927, and 20 passenger trailers for interurban service in 1928 as compared with 13 for 1927.

Interest naturally is greatest in the number of passenger cars purchased. Comparison of the last three years shows a total of 694 passenger cars ordered during 1928 as compared with 945 in 1927 and 1,558 in 1926. The numbers of city surface passenger cars in these were respectively 601, 754, and 932. No rapid transit motor cars or trailers were purchased in 1928, while there were 70 motor cars for rapid transit lines purchased in 1927 and 317 in 1926. Only 6 single-truck passenger cars were purchased in 1928, all being bought by the Mobile Light & Railroad Company. For interurban service 93 passenger cars were purchased in 1928 as compared with 121 in 1927 and 309 in 1926. The numbers of the various types of cars purchased during the last thirteen years are given in Table II.

Comparisons of the new cars purchased during 1928 are given at the beginning of this article in Table I and in the diagrams on page 79. From these it will be seen that 268, or more than 41 per cent of the cars purchased for city service, were of the one-man, two-man type. The next largest orders were for the two-man type, there being 219 of these or nearly 34 per cent of the total for city service. One-man, double-truck cars constituted 16½ per cent of the total, there being 108 of these, while the number of one-man, single-truck cars, being but 6, is less than 1 per cent of the total. Service and miscellaneous cars numbered 51, this being 7.8 per cent of the total of cars purchased for city service.

As has been the case for several years past, express and freight cars constitute the majority of those bought for interurban service. In 1928 there were 104 of these or nearly 50 per cent of all interurban cars bought. This number is made up of 100 freight cars purchased by the Illinois Traction System and 4 purchased by three other railroads. Of passenger cars for interurban service, the two-man type was bought in greatest proportion, there being 41 of these or slightly more than 19 per cent of the total. Cars of the one-man, double-truck type constituted 8 per cent and motor cars and trailers for train operation nearly 17 per cent. Miscellaneous cars for interurban service made up only 7½ per cent of the total during 1928.



Relative purchases of one-man; one-man, two-man; and two-man cars for the last thirteen years

Table V—New Rolling Stock Ordered Since 1907

Year	Passenger Cars City	Passenger Cars Interurban	Freight and Miscellaneous Cars	Electric Locomotives	Total
1907	3,483	1,327	1,406	(a)	6,216
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
1913	3,820	547	1,147	(a)	5,514
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	17	3,598
1921	1,059	129	81	7	1,276
1922	2,910	187	405	34	3,536
1923	2,915	427	595	92	4,029
1924	1,985	538	1,538	31	4,092
1925	1,054	320	238	47	1,659
1926	1,249	309	264	60	1,882
1927	824	121	363	40	1,348
1928	601	93	171	32	897

(a) Included in "Freight and Miscellaneous Cars."

Table VI—Dimensions of One-Man, Double-Truck Cars Ordered for City Service in 1928

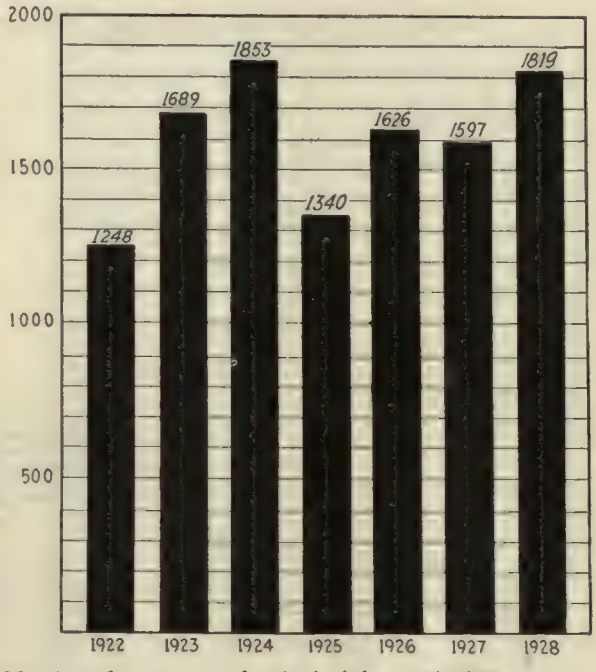
Railway	Number Cars Ordered	Length Ft. In.	Weight Tons	Number Seats
Beech Grove Traction Corp.	1	39—8	12.50	44
Key System Transit Co.	1	40—8	15.00	45
Milwaukee Electric Ry. & Light Co.	10	45—0	18.47	54
Montreal Tramways	65	41—2	18.00	49
Oshawa Ry.	5	41—10	16.00	48
Pittsburg Rys.	2	44—6	19.00	36
Regina Municipal Ry.	7	41—2	16.82	47
Saskatoon Municipal Ry.	4	40—0	14.50	44
West Penn Rys.	2	43—1⅝	17.50	44
	97			
Maximum		45—0	19.00	54
Minimum		39—8	12.50	36
Weighted Average		41—8⅛	17.64	48

Various trends since 1916 in purchases of passenger cars for city operation are shown in the chart on page 80. It will be remembered that the Birney safety car first made its appearance in 1916, and this was really the beginning of one-man operation. At that time, of course, the majority of cars were of the two-man type, in 1916 there being 2,731 two-man cars purchased as against 187 one-man, single-truck cars with 28-ft. bodies. The one-man, single-truck car increased in popularity up to and including 1920, when a total of 1,699 cars of this type were bought. Since that time there has been a rapid drop and for the last two years, 1927 and 1928, no single-truck cars of the 28-ft. length have been purchased and in 1928 there were only six single-truck cars with bodies longer than 28 ft. purchased.

The year 1922 was marked by the introduction of single-truck cars with bodies longer than 28 ft., arranged for one-man operation, and also by the introduction of one-man, two-man double-truck cars. Since that time the latter type of car has increased in popularity and for the last six years, except in 1927, more of this type of car

Table VII—Dimensions of One-Man, Two-Man Cars Ordered for City Service in 1928

Railway	Number Cars Ordered	Length Ft. In.	Weight Tons	Number Seats
Calgary Municipal Ry.	3	46—0	19.36	52
Cincinnati Street Ry.	100	44—7⅜	17.90	50
	4	44—0	17.83	48
City of Detroit, Department of Street Rys.	100	48—5¼	18.50	52
Delaware Electric Power Co.	10	42—1½	18.30	44
Dominion Power & Transmission Co. Ltd.	12	44—0	13.50	44
Phoenix Street Ry.	18	39—1	15.00	40
Quebec Railway Light & Power Co.	20	41—0	20.00	42
Winnipeg Electric Co.	1	53—3	20.00	60
	268			
Maximum		53—3	20.00	60
Minimum		39—1	13.50	40
Weighted Average		45—3¾	17.92	49



Number of cars reported as junked during the last seven years

than of any of the other type were purchased for city operation. In 1928 there were 49 more one-man, two-man cars purchased for city service than were the straight two-man type. The greatest number of one-man, two-man cars for city service were purchased during the years 1923 and 1924, there being 1,076 of this type purchased in 1923 and 1,224 in 1924. Since then purchases of all types of cars have fallen off.

Details of rolling stock ordered by individual companies are given in Table X, arranged alphabetically for each state. Reports from railways in the Dominion of Canada are grouped separately. The greatest number of cars purchased by railways in a single state was for Ohio, with a total of 204. The state of Illinois has second place in the number of cars purchased, 100 of these, however, being freight cars purchased by the Illinois Traction System. The order of 100 cars by the city of Detroit brings Michigan into third place in the number of cars purchased during 1928. These three states are the only ones in which purchases of 100 or more cars were reported. In the Dominion of Canada the Montreal Tramways with a total of 164 cars purchased tops the list.

Table VIII—Dimensions of Two-Man Cars Ordered for City Service in 1928

Railway	Number Cars Ordered	Length Ft. In.	Weight Tons	Number Seats
Cleveland Ry.	50	51—0	22.40	55
Dallas Ry. & Terminal Co.	17	45—8½	19.65	48
Market Street Ry.	26	47—0	19.80	52
Monongahela, West Penn Public Service Co.	10	45—3	17.77	48
Montreal Tramways	80	46—2	18.00	42
	6	41—2	18.00	42
	189			
Maximum		51—0	22.40	55
Minimum		41—2	17.77	42
Weighted Average		47—3¾	19.54	48

Table IX—Average Sizes of Double-Truck Passenger Cars Purchased for City Service During Last Three Years

Year	Number of Cases	Length Ft. In.	Weight Tons	Seats
1926	834	43—5	17.36	44
1927	738	45—5	18.20	47
1928	554	45—4	18.40	48

Table X—Rolling Stock Ordered During 1928

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No. Motors	Seating Capacity	One or Two Man	No. Cars Junked During Year†
Alabama											
Mobile Light & R.R. Co.	6	Passenger	City	Motor	Single	29— 6	10.25	2	33	One	7 CSM 3 CST
Arizona											
Phoenix Street Ry.	18	Passenger	City	Motor	Double	39— 1	15.00	4	40	Both	
Warren Co.											6 IM
Arkansas											
Texarkana Street Ry.											2 CSM
California											
Key System Transit Co.	1	Passenger	City	Motor	Double	40— 8	15.00	4	45	One	39 CDM 4 CDMW 3 CSMW 23 CDTW 12 CSTW
Market Street Ry.	26	Passenger	City	Motor	Double	47— 0	19.80	4	52	Two	26 CDM
Northwestern Pacific R.R.	5	Passenger	Interurban	Motor	Double	72— 4½	59.50	4	98	Train	
	5	Passenger	Interurban	Trailer	Double	72— 4½	35.50		103		
Pacific Electric Ry.	10	Passenger	Interurban	Motor	Double	52— 2	28.90	4	65	Two	25 IDM
	2	Dump	Interurban	Motor	Double	40— 0	36.90	4			5 IDW
	7	Dump	Interurban	Trailer	Double	40— 0	25.75				27 IF
San Diego Electric Ry.											5 CDM
Southern Pacific Co.											24 CDM 1 CMW
Colorado											
Denver Tramway											2 CDM 1 IF
Connecticut											
Connecticut Co.											1 CSM 17 CDOM 4 CDM 3 CSMW
Delaware											
Delaware Electric Power Co.	10	Passenger	City	Motor	Double	42— 1½	18.30	4	44	Both	
District of Columbia											
Capital Traction Co.											128 CSM 49 CST 4 CSW
Washington Ry. & Electric Co											16 CDM
Florida											
Gulf Power Co.											2 CSOM 1 CSM 2 ITW
Illinois											
Chicago & West Towns Ry.	1	Snow plow	Interurban	Motor	Double	44— 0		4			
Illinois Central System	10	Passenger	Interurban	Motor	Double	72— 7½	70.00	4	84	Train	
	10	Passenger	Interurban	Trailer	Double	72— 7½	43.25		84		
Illinois Traction System	100	Freight	Interurban	Trailer	Double	37—11	22.00				
Indiana											
Beech Grove Traction Corp.	1	Passenger	City	Motor	Double	39— 8	12.50	4	44	One	
Chicago South Shore & South Bend R.R.	15	Passenger	Interurban	Motor	Double	60— 0	65.00	4	52	Two	
	5	Passenger	Interurban	Trailer	Double	60— 0	50.00		52		
	2	Caboose	Interurban	Trailer	Double	30— 0	19.00			Train	
Gary & Southern Traction Co.	2	Passenger	Interurban	Motor	Double	44—10	21.00	4	50	One	
Indianapolis & Cincinnati Traction Co.	10	Passenger	Interurban	Motor	Double	46— 2	20.00	4	38	One	12 IDM
Interstate Public Service Co.	1	Freight	Interurban	Trailer	Double	48— 8					
Iowa											
Cedar Rapids & Marion City Ry.											3 CSM
Iowa Ry. & Light Co.											10 CSM
Waterloo, Cedar Falls & Northern Ry.	5	Dump	Interurban	Trailer	Double	36—11½	32.65				1 IT
Kansas											
Union Traction Co.											3 CDM
Kentucky											
Kentucky Traction & Terminal Co	1	Passenger	Interurban	Motor	Double	40— 3	13.00	4	44	One	
Kentucky Utilities Co.											5 CM
Maine											
Cumberland County Power & Light Co.	1	Snow plow	City	Motor	Double						25 CDM 9 IE
Massachusetts											
Boston Elevated Ry.	1	Work	City	Trailer	Double	47— 3					
	6	Snow plows	City	Motor	Double	46— 2¾	37.10	4			
Eastern Massachusetts Street Ry.											17 CDM 7 CDOM 2 SP 3 CDMW
Springfield Street Ry.											44 CSOM 23 CSM 34 CDM 12 IDMF 12 CSMW
Worcester Consolidated Street Ry.											4 SP 1 CSTW 5 CDOM
Maryland											
United Rys. & Electric Co.											12 CSM 11 CDM
Michigan											
City of Detroit—Department of Street Rys.	100	Passenger	City	Motor	Double	48— 5½	18.50	4	52	Both	59 CDM 4 CSMW
Menominee & Marinette Light & Traction Co.											6 CSM 14 CDM
Minnesota											
Northern States Power Co.											2 IDOM 2 CSM
Missouri											
Springfield Traction Co.											10 CDM 3 CDT 8 CW
St. Joseph Ry., Light, Heat & Power Co.											1 CSM 8 CST
St. Louis Public Service Co.											13 CDM 2 CDMW 1 CSTW

Table X—Rolling Stock Ordered During 1928—Continued

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No. Motors	Seating Capacity	One or Two Man	No. Cars Junked During Year†
Nebraska											
Lincoln Traction Co.											6 CSM
New York											
Brooklyn-Manhattan Transit Corp.											85 CDM
Jamaica Central Rys.											2 CMW 1 CT
New York State Rys. (Rochester)											4 CDM 6 CSTW 1 ITE
New York, Westchester & Boston Ry.	10	Passenger	Interurban	Motor	Double	72— 0½	63.00	2	80	Two	
Niagara Gorge R.R.											1 CDM
United Traction Co.											59 CSM
Ohio											
Cincinnati Street Ry.	100	Passenger	City	Motor	Double	44— 7½	17.90	4	50	Both	11 CDM
	4	Passenger	City	Motor	Double	44— 0	17.83	4	48	Both	
Cleveland Ry.	28	‡Passenger	City	Motor	‡Three	101— 0	38.04	6	100	Two	40 CDM
	50	Passenger	City	Motor	Double	51— 0	22.40	4	55	Two	8 CDT
	8	Dump	City	Motor	Double	39— 0½	24.00	4			
	4	Dump	City	Trailer	Double	36— 0½	17.50				
	6	Dump	City	Trailer	Double	40— 0	12.75				
Cleveland Southwestern Ry. & Lt. Co.											1 CDM 3 IDM
Northern Ohio Power & Light Co.											63 CDM 27 IDM
Stark Electric Co.	3	Passenger	Interurban	Motor	Double	47— 3	16.25	4	52	One	3 CDM
	1	Freight	Interurban	Trailer	Double	48— 8					2 IDM
Oklahoma											
Northeast Oklahoma R.R.											1 IDM
Pennsylvania											
Allegheny Valley Street Ry.	1	Work	Interurban	Motor	Double	45— 0		4			2 ISMW
Citizens Traction Co.											20 CM 6 IDM 3 CW
Lackawanna & Wyoming Valley R.R.	3	Passenger	Interurban	Motor	Double	63— 2	45.00	2	76	Two	3 IDM
	1	Passenger	Interurban	Motor	Double	63— 2	45.00	1	56	Two	
Lehigh Valley Transit Co.	1	Dump	City	Motor	Double	40— 0		4			
Philadelphia Rapid Transit Co.	1	Crane	City	Motor	Double	65— 0	59.50	2			
	1	Work	City	Motor	Double	51— 8½	41.30	2			
Philadelphia & Western Ry.											1 IDM
Pittsburgh Rys.	2	Passenger	City	Motor	Double	44— 6	19.00	4	36	One	9 IDM 4 CDT 6 CDM 21 CSM
West Penn Rys.	2	Passenger	City	Motor	Double	43— 1½	17.50	4	44	One	2 ISMW 1 IDMW
South Carolina											
South Carolina Power Co.											18 CSM 6 CDM
Tennessee											
Knoxville Power & Light Co.	2	Work	City	Motor	Double	22— 0	9.00	2			
Texas											
Dallas Ry. & Terminal Co.	17	Passenger	City	Motor	Double	45— 8½	19.65	4	48	Two	16 CDM
Eastern Texas Electric Co.											5 CDM
Houston Electric Co.											9 CSM
Houston North Shore Ry.	1	Passenger	Interurban	Motor	Double	44— 4	20.00	4	51	One	
Northern Texas Traction Co.											16 CSM 3 IDT
Utah											
Utah Light & Traction Co.	*11	Passenger	City	Motor	Double	31— 7½	8.15	2	45	One	5 CDM
Virginia											
Roanoke Ry. & Electric Co.											3 CSM
Virginia Electric Power Co.											6 CSM 1 CDM 11 CSOT
Washington											
Puget Sound Power & Light Co.											5 IDL 5 IDW 137 IMF 175 IDM 16 IDT
Spokane United Rys.											2 CM
West Virginia											
Monongahela West Penn Public Service Co.	0	Passenger	City	Motor	Double	45— 3	17.77	4	48	Two	
Wheeling Traction Co.	1	Work	City	Motor	Double	40— 0		4			2 IDM 2 ISM
Wisconsin											
Milwaukee Electric Ry. & Light Co.	10	Passenger	City	Motor	Double	45— 0	18.47	4	54	One	1 IDT
	1	Dining car	Interurban	Motor	Three	90— 0	67.50	4	57	Two	
	1	Dining car	Interurban	Motor	Three	90— 0	67.50	4	32	Two	
Mississippi Valley Public Service Co.											1 CDM
Wisconsin Public Service Corp.											19 IDM 4 IDW
DOMINION OF CANADA											
Alberta											
Calgary Municipal Ry.	3	Passenger	City	Motor	Double	46— 0	19.36	4	52	Both	
	1	Sweeper	City	Motor	Double		36.00	4			
Manitoba											
Winnipeg Electric Co.	1	Passenger	City	Motor	Double	53— 3	20.00	4	60	Both	
Newfoundland											
Newfoundland Light & Power Co.											1 CM
Ontario											
Dominion Power & Transmission Co., Ltd.	12	Passenger	City	Motor	Double	44— 0	13.50	4	44	Both	16 CSM
Fort William Electric Ry.											4 CDM
Hydro-Electric Rys.	3	Work	City	Motor							
Niagara, St. Catharines & Toronto Ry.											3 CM 4 IDM
Oshawa Ry.	5	Passenger	City	Motor	Double	41— 10	16.00	4	48	One	
Toronto Transportation Commission											1 ISMW 2 IDM 6 IDTF

*Trackless trolleys. †See explanation on page 84. ‡Two section articulated units.

Table X—Rolling Stock Ordered During 1928—Concluded

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No. Motors	Seating Capacity	One or Two Man	No. Cars Junked During Year
Quebec											
Montreal Tramways Co.	65	Passenger	City	Motor	Double	41— 2	18.00	4	49	One	24 CSM
	80	Passenger	City	Motor	Double	46— 2	18.00	4	42	Two	45 CDM
	6	Passenger	City	Motor	Double	41— 2	18.00	4	42	Two	.....
	2	‡Passenger	City	Motor	‡Three	80— 0	29.40	4	90	Two	.....
	2	Snow plows	City	Motor	.....	.....	.....	.....	.....	.....	.....
	4	Sweepers	City	Motor	.....	.....	.....	.....	.....	.....	.....
	1	Work	City	Motor	Double	44— 0	.....	4	.....	.....	.....
	4	Dump	City	Motor	Double	40— 0	.....	4	.....	.....	.....
Quebec Ry. Light & Power Co.	20	Passenger	City	Motor	Double	41— 0	20.00	4	42	Both	14 CSM
	2	Snow plows	City	Motor	Double	35— 0	25.00	4	.....	.....	.....
	1	Sprinkler	City	Motor	Double	35— 0	20.00	4	.....	.....	.....
Sherbrooke Ry. & Power Co.	1	Work	City	Motor	Double	40— 0	18.00	4	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1 CSM
Saskatchewan											
Regina Municipal Ry.	7	Passenger	City	Motor	Double	41— 2	16.82	4	47	One	.....
Saskatoon Municipal Ry.	4	Passenger	City	Motor	Double	40— 0	14.50	4	44	One	.....

‡ Two section articulated units.

ABBREVIATIONS AND NUMBER OF TYPES OF CARS JUNKED

CDM—City, double truck, motor	599
CDMW—City, double truck, motor, work	9
CDOM—City, double truck, open, motor	27
CDT—City, double truck, trailer	15
CDTW—City, double truck, trailer, work	23
CM—City, motor	31
CMW—City, motor, work	3
CSM—City, single truck, motor	389
CSMW—City, single truck, motor, work	22
CSOM—City, single truck, open, motor	46
CSOT—City, single truck, open, trailer	11
CST—City, single truck, trailer	60
CSTW—City, single truck, trailer, work	20
CSW—City, single truck, work	4
CT—City, trailer	1
CW—City, work	11
SP—Snow plow	6
IDL—Interurban, double truck line	5
IDM—Interurban, double truck, motor	291
IDMF—Interurban, double truck, motor, freight	12
IDMW—Interurban, double truck, motor, work	1
IDOM—Interurban, double truck, open, motor	2
IDT—Interurban, double truck, trailer	20
IDTF—Interurban, double truck, trailer, freight	6
IDW—Interurban, double truck, work	14
IE—Interurban, express	9
IF—Interurban, freight	28
IM—Interurban, motor	6
IMF—Interurban, motor, freight	137
ISM—Interurban, single truck, motor	2
ISMW—Interurban, single truck, motor, work	5
IT—Interurban, trailer	1
ITE—Interurban, trailer, express	1
ITW—Interurban, trailer, work	2
Total	1,819

For convenience in comparing rolling stock purchases during the past 22 years, and to show at a glance the number of cars purchased as divided between city and interurban passenger cars, and freight, express, service and miscellaneous cars, Table V has been prepared.

In addition to this table the trend of purchases is shown by the diagram on page 80. In this analysis the total rolling stock purchased each year is divided into three classifications; city passenger cars, interurban passenger cars, and miscellaneous, express, freight, service and electric locomotives. High points of purchases are shown by the chart for the years up to and including 1913, again for 1916, 1920 and for the years 1922, 1923, and 1924.

Purchases of electric locomotives during 1928 are listed in Table IV. The total number of electric locomotives bought is 32, as compared with 40 in 1927, 60 for 1926 and 47 for 1925. Locomotives were purchased by nineteen different companies in 1928. The heaviest and largest unit was that purchased by the Great Northern Railway, weighing 307½ tons.

In analyzing the various types of passenger cars purchased for city service during 1928, it is found that they are generally similar in length, weight and seating capacity. Details and comparisons are given in tables VI, VII and VIII. Lengths of one-man, double-truck cars vary between 39 ft., 8 in., and 45 ft. The weighted average length for all cars of this type is 41 ft., 8⅛ in.

Weights for this class of car vary from 12½ tons to 19 tons. The weighted average for all cars of the one-man, double-truck type is 17.64 tons. Seating capacities vary from 36 to 54 with a weighted average of 48.

The average dimensions of cars reported, as of the one-man, two-man type, are influenced largely by the two large orders of cars for the Cincinnati Street Railway and the city of Detroit. Weights are just a little heavier than for the one-man, double-truck type. Lengths vary from 39 ft., 1 in., to 53 ft., 3 in., and the weighted average length for all cars of this type ordered in 1928 is 45 ft., 3¾ in. Weights of one-man, two-man cars vary from 13½ tons to 20 tons with a weighted average for all cars of this class of 17.92 tons. Seating capacities vary from 40 to 60 and the weighted average is 49.

The two-man cars ordered for city service in 1928 were slightly larger than the other two types. Lengths of two-man city cars vary from 41 ft., 2 in. to 51 ft., and the weighted average length for all cars of this class is 47 ft., 3¾ in. Weights for two-man city cars are from 17.77 tons to 22.4 tons and the weighted average is 19.54 tons. Seating capacities vary from 42 to 55.

While these three classes of cars are reported under different names, actually they are similar in length, weight and seating capacity. To show variations of cars purchased for city service during the last three years, a general summary is given in Table IX. This gives weighted averages for all classes of cars reported, as ordered for city service, and include the double-truck, one-man car; the one-man, two-man type, and the straight two-man type. Lengths for 1927 and 1928 are practically the same and are about 2 ft. longer than for 1926. Weights have increased slightly, the average weight for 1926 being 17.36 tons, that for 1927, 18.2 tons and for 1928, 18.4 tons. Seating capacities also have increased slightly from 44 to 48.

An accompanying diagram shows graphically the number of cars junked during the past seven years. Referring to this diagram, it is seen that the number of cars junked during 1928, except for the year 1924, is the highest reported. There were a total of 1,819 cars junked during 1928, while the number for the year 1924 was 1,853. The last column of Table X shows the number of cars junked during the year arranged by companies, and at the bottom of this table the abbreviations used are explained and the numbers of each individual type is given. By grouping these into classes it is found that there were 1,277 city cars junked and 542 interurban cars. This includes 1,199 city passenger cars, 322 interurban passenger cars and 298 freight, express and miscellaneous cars. The two largest classes of cars for city service were 599 double-truck, motor cars and 389 single-truck, motor cars. Of the cars reported as used in interurban service, there were 291 double-truck, motor cars junked and 137 freight motor cars junked.

Financial Status

IMPROVED MATERIALLY

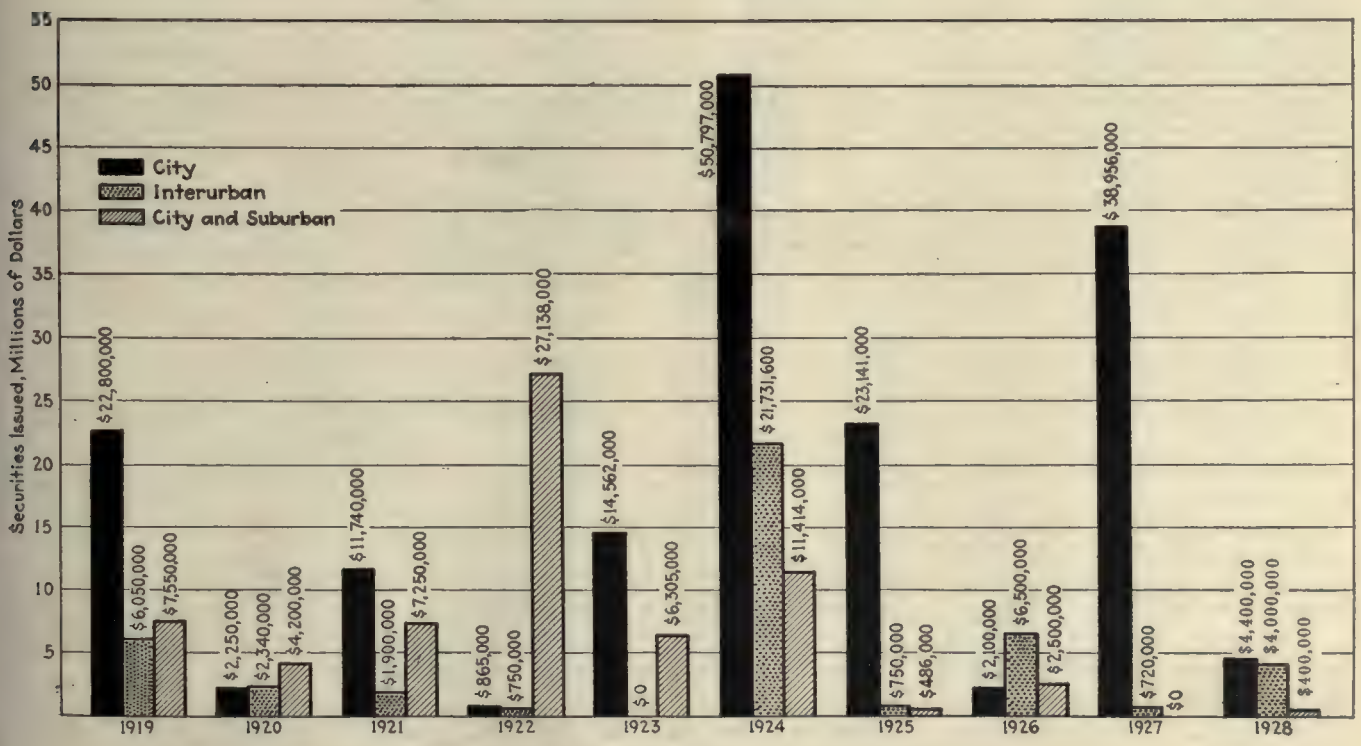
Electric railway receiverships in 1928 were lowest on record. Restoration of industry's credit is progressing steadily. Refunding small in last year and in 1929

AGAIN, as in 1927, not one property of major importance was thrown into receivership. In fact, the receiverships were fewer in number than for any year since the cumulative record was begun in 1909. No company with more than 100 miles of track is included in the list of new receiverships and only two with trackage of more than 50 miles. These were the Buffalo & Erie Railway and the Puget Sound Electric Railway. On the constructive side, the affairs of the Detroit United were straightened out and the lines turned over to the successor railway, although, technically, the receivership for the old property is understood to be still in effect.

Financing by electric railways done publicly in 1928 was the smallest during the ten years for which the ELECTRIC RAILWAY JOURNAL has been keeping the record. The total was $8,800,000, divided, as an accompanying table indicates, into $4,400,000 for the city railways, $4,000,000 for the interurbans, and $400,000 for the city and suburban railways. This, of course, takes into account offerings only in amount of more than $400,000. On the other hand, the maturities for the coming year are the smallest of any except one for which the record has been kept during the last ten years.

In the table of the disposition of the maturities for the year recently ended, the big items all appear to have been provided for in the period of easy money at the close of 1927. This was true of the Omaha & Council Bluffs issue, which was extended, and also of the Minneapolis & St. Paul city issue of $10,000,000. The tabulated statement of the disposition of the maturities in 1928, compiled with the aid of the statistical department of the American Electric Railway Association, tells its own story.

No really great improvement has been shown in the amount of outstanding electric railway bonds in default, this sum still being about $250,000,000 as it was at this time last year when the figures were compiled. The tendency should now be downward, since the electric railways have passed through their most trying period. From year to year the receivership situation has been improving. Thus more than $10,000,000



Ten-year record of financing done by electric railways

Table I—Ten-Year Record of New Electric Railway Financing Involving Bond or Note Issues of More Than $400,000

	City Railway	Interurban	City and Suburban
1919	$22,800,000	$6,050,000	$7,550,000
1920	2,250,000	2,340,000	4,200,000
1921	11,740,000	1,900,000	7,250,000
1922	865,000	750,000	27,138,080
1923	14,562,000	.....	6,305,000
1924	50,797,000	21,731,600	11,414,000
1925	23,141,000	750,000	486,000
1926	2,100,000	6,500,000	2,500,000
1927	38,956,000	720,000	0
1928	4,400,000	4,000,000	400,000

Table II—Comparison of Maturities in the Electric Railway Field

1929	$27,316,600	1924	$73,051,600
1928	47,577,200	1923	94,851,800
1927	180,798,000	1922	160,015,860
1926	26,644,790	1921	207,617,530
1925	28,224,000	1920	80,466,100

of the issues of the Detroit United Railway were eliminated from the list, due to foreclosure and sale. Other issues, somewhat similar in nature, eliminated from the list are the Indianapolis & Cincinnati and the Morris County obligations, to mention just a few.

During the year two issues of stock were sold directly to the public, the Philadelphia Rapid Transit Company issue of $12,000,000 of 7 per cent stock, and the Chicago, South Bend & South Shore offering of $1,500,000 of 6½ per cent cumulative Class A stock, placed at $96.50 per share.

Only one major maturity of material size presents itself for disposition during 1929. This is the Brooklyn-Manhattan Transit one-year transaction of $10,000,000.

Table IV—Principal Electric Railway Maturities in 1929

(Based on Dow Jones & Company Compilation)

	Rate	Amount
January		
Interborough Rapid Transit Company ctfs	6½	$ 450,000
New Bedord, Middleboro & Brockton Street Railway 1st	5	324,000
Eastern Massachusetts Street Railway ref	6	300,000
Brooklyn City Railroad eq. tr	5	375,000
		$1,449,000
February		
South Shore & Boston Street Railway 1st	5	331,000
Philadelphia Rapid Transit eq. tr. G	5½	237,500
Pittsburgh Railways eq. tr	6	200,000
		768,500
May		
Marion City Railway 1st	6	328,000
July		
Lebanon Valley Street Railway 1st	5	500,000
Erie Traction 1st	5	353,000
Central Traction 1st	5	325,500
Sand Springs Railway 1st	6	300,000
La Crosse City Railway 1st	5	220,000
		1,698,500
August		
Atlantic & Suburban Railway 1st	4	591,100
Philadelphia Rapid Transit Company eq. tr. G	5½	237,500
Aroostook Valley Railroad 1st	4½	200,000
Brooklyn-Manhattan Transit 1 yr	6	10,000,000
		11,028,600
September		
Wilkinsburg & East Pittsburgh Railway 1st	5	1,989,000
Terre Haute, Indianapolis & Eastern Traction clt	6½	425,000
Hoosac Valley Street Railway ref	7	300,000
		2,714,000
November		
Baltimore Traction 1st	5	1,500,000
Pittsburg & Birmingham Traction 1st	5	1,500,000
Niagara, St. Catherines & Toronto 1st	5	1,098,000
Interborough Rapid Transit Company ctfs C	6	570,000
		4,668,000
December		
Lynn & Boston Railroad 1st	6	2,519,000
St. Louis Electric Terminal Railway 1st	5	1,724,000
Johnstown Passenger Railway cons	4	399,000
East McKeesport Street Railway 1st	5	250,000
Philadelphia Rapid Transit Company eq. tr. H	5½	270,000
		$5,162,000
Total		$27,816,600

Table III—Statement of Disposition of Electric Railway Maturities in 1928

Name of Company and Issue	Amount	Remarks
January		
Omaha & Council Bluffs Street Railway	$ 8,995,000	Extended
Omaha & Council Bluffs Railway & Bridge	1,923,000	Refunded
Oklahoma Railway, clt H notes	825,000	Retired
Stark Electric Railroad, 1st	730,000	Refunded
Los Angeles & Pasadena Electric Railway, 1st	628,000	Retired
Interboro Rapid Transit, eq. tr. B	450,000	Retired
Milford & Uxbridge Street Railway, 1st	335,000	(a)
Eastern Mass. Street Railway, serial	300,000	Retired
Niagara Falls Suspension Bridge & Clifton Susp. Bridge (International Ry.) 1st	300,000	Retired
Pennsylvania & Maryland Street Railway, 1st	224,000	Unknown
Brooklyn City Railroad, eq. tr	375,000	Retired
Bloomington & Normal Ry. & Lt., gen	1,164,000	Retired
Central Illinois Public Service, ser	400,000	Retired
January Total	$16,649,000	
February		
Pittsburgh Railways, 4 yr	$ 500,000	Retired
Philadelphia Rapid Transit, eq. tr. G	237,500	Retired
Pittsburgh Railways, car trust	200,000	Retired.
February Total	$ 937,500	
March		
Interboro Rapid Transit, eq. tr. A	$ 280,000	Retired
March Total	$ 280,000	
May		
New York City Interboro Railway, 1st	$ 2,164,000	Extended
City Light & Traction, 1 year	1,000,000	Retired
May Total	$ 3,164,000	
June		
Monongahela Street Railway, 1st	$ 998,000	Extended
June Total	$ 998,000	
July		
North Hudson County Railway, cons	$ 2,998,000	Retired
Chicago, No. Shore & Milwaukee R.R., 5 yr	2,684,200	Exchanged for 6% Pfd. stock
Lake Street Elev. R.R., 1st	1,598,000	Refunded
Pittsfield Electric St. Ry., 1st	242,000	Extended
July Total	$ 7,522,200	
August		
Philadelphia Rapid Transit, eq. tr. G	$ 237,500	Retired
Eastern Texas Electric, 3 year	4,000,000	Retired
Minneapolis Street Railway, 1st	5,000,000	Retired
August Total	$ 9,237,500	
September		
Southwest Missouri Electric Ry. ref	$ 1,150,000	Unknown
September Total	$ 1,150,000	
October		
Minneapolis & St. Paul City Ry., joint	$10,000,000	Refunded
October Total	$10,000,000	
November		
Dayton, Springfield & Urbana Ry., 1st	$ 1,500,000	Unknown
Interboro Rapid Transit, eq. tr. C	570,000	Retired
Columbus Electric & Power, 3 yr	2,500,000	Refunded
November Total	$ 4,570,000	
December		
Buffalo & Lackawanna Traction, 1st	$ 1,160,000	Unknown
Philadelphia Rapid Transit, eq. tr. H	270,000	Retired
December Total	$ 1,430,000	

(a) Company sold. Nothing as yet paid upon the principal of the bonds.

Summary of Disposition of Electric Railway Maturities in 1928

Month	Retired	Refunded	Extended	Exchanged	No Disposition	Unknow
Jan	$4,442,000	$2,653,000	$8,995,000	.....	$335,000	$224,000
Feb	937,500	.....	.....	.....	.....	.....
Mar	280,000	.....	.....	.....	.....	.....
Apr	.....	.....	.....	.....	.....	.....
May	1,000,000	.....	2,164,000	.....	.....	.....
June	.....	.....	998,000	.....	.....	.....
July	2,998,000	1,598,000	242,000	$2,684,200	.....	.....
Aug	9,237,500	.....	.....	.....	.....	.....
Sept	.....	.....	.....	.....	.....	1,150,000
Oct	.....	10,000,000	.....	.....	.....	.....
Nov	570,000	2,500,000	.....	.....	.....	1,500,000
Dec	270,000	.....	.....	.....	.....	1,160,000
Totals	$19,735,000	$16,751,000	$12,399,000	$2,684,200	$335,000	$4,034,000

Grand Total $55,938,200

Table V—Outstanding Electric Railway Bonds in Default of Interest

(Based on Compilation by Dow, Jones & Company)

	Amount	Defaulted	
Auburn & Syracuse Elec. R.R. 5's	$1,752,000	April	1926
Binghamton Railway cons 5's	1,833,000	May,	1926
general & refunding 6's	426,200	July,	1925
Binghamton Railroad 6's, 1925	452,000	July,	1925
Binghamton, Lestershire & Union 5's, 1925	147,000	June,	1925
Bloomfield St. Ry. 5's, 1923	250,000	Aug.,	1923
Boise Valley Traction 5's, 1925	750,000	Jan.,	1923
Boise & Interurban Ry. 1st 5's	964,000	April,	1923
Brownsville Avenue St. Ry. 5's, 1926	300,000	Aug.,	1926
Buffalo & Erie 1st 6½'s	994,000	July,	1928
Buffalo & Lackawanna Traction 5's	1,150,000	Dec.,	1918
Calumet & South Chicago 5's, 1927	5,532,000	Feb.,	1927
Central Passenger Ry. 6's, 1924	125,000	Oct.,	1924
Chatham, Wallace & Lake Erie 5's, 1925	694,500	July,	1925
Chicago City & Connecting Railways 5's, 1927	20,616,000	Jan.,	1927
Chicago City Railway 5's, 1927	33,926,000	Feb.,	1927
Chicago Railways, 1st 5's, 1927	55,655,000	Feb.,	1927
consolidated A 5's, 1927	16,703,800	Feb.,	1927
consolidated B 5's, 1927	17,164,475	Feb.,	1927
purchase money 5's, 1927	4,073,000	Feb.,	1927
adjustment income 4's, 1927	2,500,000	Feb.,	1927
Chicago, South Bend & Northern Indiana 5's	3,099,000	Jan.,	1928
Citizen's Traction 1st 5's, 1927	246,000	Oct.,	1927
Clinton Street Ry., Clinton, Ia., 1st 5's, 1926	400,000	April,	1926
Columbus, London & Springfield 5's, 1920	1,260,000	Oct.,	1920
Dayton Springfield & Urbana 5's, 1928	750,000	Nov.,	1928
Des Moines City Ry. deb. 7's, 1927	618,000	April,	1927
Detroit, Altmont & Northern 6's	400,000	Aug.,	1925
Detroit, Jackson & Chicago 5's	881,000	July,	1925
Evansville & Ohio Valley Ry. 5's	1,034,000	Jan.,	1928
Geneva, Seneca Falls & Auburn 5's	497,000	Jan.,	1926
Hudson Valley Ry. cons. 5's	2,222,000	July,	1928
Indianapolis, Columbus & East Trac. 5's, 1926	6,400,000	Nov.,	1919
Indiana Northern Traction 5's	500,000	April,	1925
Indiana Ry. 1st 5's	1,000,000	Jan.,	1928
Indiana Union Traction 1st 5's	1,126,000	April,	1925
Indianapolis, Newcastle & East 6's	1,200,000	June,	1925
Indianapolis Northern Traction 5's	5,000,000	Jan.,	1925
Inter-Urban Railway, Des Moines, 1st 7½'s	652,500	April,	1927
debenture 6's	250,000	Jan.,	1923
Ithaca Street Ry. 1st 6's, 1922	175,000	July,	1922
Ithaca Traction ref. 5's	488,000	April,	1922
Jackson Consol. Traction 5's	790,000	May,	1925
Joplin & Pittsburgh Ry 1st 5's			
general 7's			
Kansas-Oklahoma Traction 6's	250,000	Nov.,	1924
La Porte & Michigan City Trac. 5's	234,000	Nov.,	1924
Lakeside Railway 1st 6's	150,000	May,	1926
Lima, Findlay & Toledo 5's, 1925	324,000	July,	1925
Lowell & Fitchburg St. Ry. 5's, 1926	275,000	Jan.,	1926
Michigan Electric Ry. ref. 5's	7,190,500	Jan.	1925
Michigan Railroad 1st 6's, 1924	4,050,000	May,	1924
Millvale, Etna & Sh. St. Ry. 5's 1923	741,000	Nov.,	1923
Minneapolis, Anoka & Cuyuna Range Ry. 5's	380,000	Nov.,	1925
Mississippi Valley Ry. & Pwr. 5's	800,000	July,	1917
Muncie, Hartford & Ft. Wayne 5's	916,000	Jan.,	1925
Muncie & Union City Traction 5's	925,000	Jan.,	1925
New York & Queens County Ry. cons. 4's	1,300,000	April,	1922
Northern Indiana Ry. cons. 5's	588,000	Jan.,	1928
Ogdensburg Street Railway 6's	150,000	Sept.,	1925
Penn Street Ry., Pittsburgh 1st 5's, 1922	250,000	June,	1922
Pittsburgh, Crafton & Mansfield 5's, 1924	171,000	July,	1924
Pittsburgh Traction 1st 5's, 1927	666,000	Oct.,	1927
Pittsburgh & W. End Pass. Ry. 5's, 1922	313,000	July,	1922
Public Light & Power 1st 5's	2,527,000	Feb.,	1928
Puget Sound Electric Ry. cons. 5's	2,427,000	Aug.,	1927
Rochester & Syracuse R.R. 1st 5's	2,448,500	May,	1927
Salt Lake & Utah 1st 5's	1,431,900	Oct.,	1925
convertible notes 7's	150,000	Oct.,	1925
Schuylkill Railway 1st 5's	180,000	April,	1926
Schuylkill Traction 1st 5's	500,000	April,	1926
consolidated 4½'s	105,000	July,	1926
Seattle & Rainier Valley Ry. 6's	484,000	July,	1928
Second Avenue R.R., New York, cons. 5's	5,682,000	Aug.,	1908
receivers' certificates 6's, 1914	3,140,000	Oct.,	1914
South Bend & So. Mich. Ry. 5's, 1927	750,000	Oct.,	1927
South Carolina Gas & Elec. 1st 6's	3,628,000	March	1928
Southern Michigan Ry. cons. 5's	395,000	March,	1928
Southwest Missouri Electric 6's	1,150,000	Sept.,	1926
Southwest Missour R.R. 5's	1,034,000	Sept.,	1926
Springfield Ry. 1st 5's	1,344,700	March,	1928
Steinway Railway, Long Island City 6's, 1922	1,500,000	July,	1922
Syracuse, Lake Shore & Nor. 5's	2,500,000	May,	1927
Tacoma Ry. & Power 1st 5's	1,236,000	April,	1928
Trenton, Bristol & Phila. Ry. 5's	413,800	March,	1925
Union Traction of Indiana gen. 6's	4,623,000	Jan.,	1925
Union Traction, Coffeyville, Kan. 5's	900,000	Jan.,	1925
Washington Electric St. Ry. 5's, 1927	125,000	Feb.,	1927
Waterloo, Cedar Falls & Northern 5's	5,773,000	Jan.,	1922
Webb City Northern El. Ry., Joplin, Mo., 5's, 1923	125,000	Sept.,	1923
Western Ohio Ry. 1st 5's	2,500,000	May,	1927
Youngstown & Ohio River 1st 5's	1,200,000	April,	1927
	$262,953,875		

Table VI—Details of New Bond and Note Financing in Amounts of More Than $400,000 Offered Publicly in 1927

Issue	Price	Maturity	Yield	Amount
Kansas City Public Service Company 1st gold 6's, Series A	95	1951	6.41	$4,400,000
Oklahoma Railway 1st M. Coll. 6½'s	100	1931	6.50	400,000
Lackawanna & Wyoming Valley Railroad 1st M's	97	1951	5.22	2,900,000
Debenture 6's	100	1948	6.00	1,100,000
Total				$8,800,000

Table VII—Electric Railway Securities Called in 1928

Month	Company	Mature	Amount	Price
April	Scranton & Wilkes-Barre Traction 6's	1934	$822,000	100
April	Warren Street Railway 2nd 5's	1931	125,000	100
July	Oklahoma Railway 1st 5's	1938	349,000	110
August	Scranton & Wilkes Barre 5's	1951	1,839,400	105
August	Lackawanna & Wyoming Valley Rapid Transit 5's	1951	733,000	105
December	Oklahoma Railway clt. 6½'s	1931	690,000	103

Table VIII—Electric Railway Receiverships—1928

	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates
Southern Michigan Railway, South Bend, Ind.	32.05	$2,000,000	$1,145,000	None
Missouri & Kansas Ry., Kansas City, Kan.	20.03	1,000,000	655,000	None
Atlantic & Suburban Railway, Atlantic City, N. J.	16.00	150,000	691,000	None
Auburn & Northern Electric Railway, Syracuse, N. Y.	(a)	(b)	236,000	None
Buffalo & Erie Railway, Fredonia, N. Y.	96.23	1,450,500	910,300	$37,479
Syracuse, Lake Shore & Northern Railway, Syracuse, N. Y.	(a)	(b)	2,496,000	None
Springfield Railway, Springfield, Ohio	40.54	1,500,000	1,335,400	None
Puget Sound Electric Railway, Tacoma, Wash.	57.10	3,116,200	7,322,000	None
Total for 1928	261.95	$9,216,700	$14,790,700	$37,479

(a) Included with Empire State R.R. figures. (See Table XI.)
(b) Information not available.

Table IX—Record of Electric Railway Receiverships

Year	Number of Companies	Miles of Single Track Involved	Outstanding Securities—Stocks	Outstanding Securities—Bonds
1909	22	558.00	$29,962,200	$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375
1916	15	359.26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,017.61	92,130,388	163,257,102
1919	48	3,781.12	321,259,354	312,915,104
1920	19	1,065.31	28,758,455	72,283,575
1921	19	986.42	32,909,525	36,177,800
1922	14	695.43	18,140,150	20,304,400
1923	12	333.63	8,332,100	14,707,066
1924	12	1,021.88	28,489,700	35,716,000
1925	14	1,260.07	51,383,195	54,696,525
1926	16	1,228.28	17,769,435	117,560,073
1927	13	624.32	17,615,050	20,875,450
1928	8	261.95	9,216,700	14,790,700

Table X—Record of Electric Railway Foreclosure Sales

Year	Number of Companies	Miles of Track Involved	Outstanding Securities—Stocks	Outstanding Securities—Bonds	Receivers' Certificates
1909	21	488.00	$22,265,700	$21,174,000	(a)
1910	22	724.36	19,106,613	26,374,075	(a)
1911	25	660.72	91,354,800	115,092,750	(a)
1912	18	267.18	14,197,300	10,685,250	(a)
1913	17	302.28	15,243,700	19,094,500	(a)
1914	11	181.26	26,239,700	44,094,241	(a)
1915	19	308.31	30,508,817	16,759,997	(a)
1916	19	430.14	13,895,400	22,702,300	(a)
1917	26	745.19	27,281,900	27,313,045	(a)
1918	23	524.22	37,740,325	20,149,384	(a)
1919	29	2,675.48	89,893,400	79,836,738	$42,300
1920	13	259.90	7,782,400	11,227,328	52,000
1921	13	777.97	33,642,255	30,863,526	5,000
1922	13	322.88	7,491,500	12,640,600	114,683
1923	15	927.45	118,077,959	110,638,250	12,265,000
1924	14	869.25	21,022,800	34,845,535	3,440,388
1925	13	569.39	18,074,300	18,329,555	53,000
1926	28	1,291.17	20,054,700	57,340,363	214,000
1927	16	940.68	53,345,000	78,445,100	3,140,000
1928	8	1,003.73	26,084,325	40,683,400	168,150

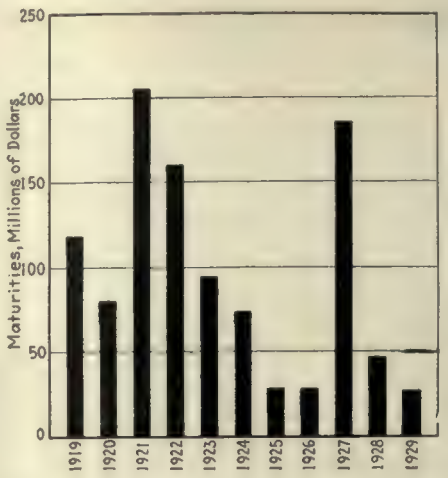
(a) Data not available.

The next largest maturity due is the Lynn & Boston issue of $2,915,000 and the third largest the Wilkensburg & Pittsburgh 5 per cent issue totaling $1,989,000. No small percentage of the other maturities represents equipment trust obligations—the largest amount being $375,000.

Mileage in receivership on Jan. 1, 1929, was not changed materially over the previous year. If account is taken of the fact that the Chicago Railways with 597 miles is in default of principal, but is paying interest regularly, then the situation is much better than would seem at first. The total of securities of the companies which went into receivers' hands was only slightly less than $25,000,000. These companies may be said to represent extreme cases, being the type of road hardest hit under the present changed economic status of transportation. Aside from the Detroit United and the Chicago Railways, the one only technically still in receivership and the other earning its interest by a liberal margin and paying its interest, no large city systems are now in the hands of the courts and only a few interurbans with systems exceeding 100 miles of track.

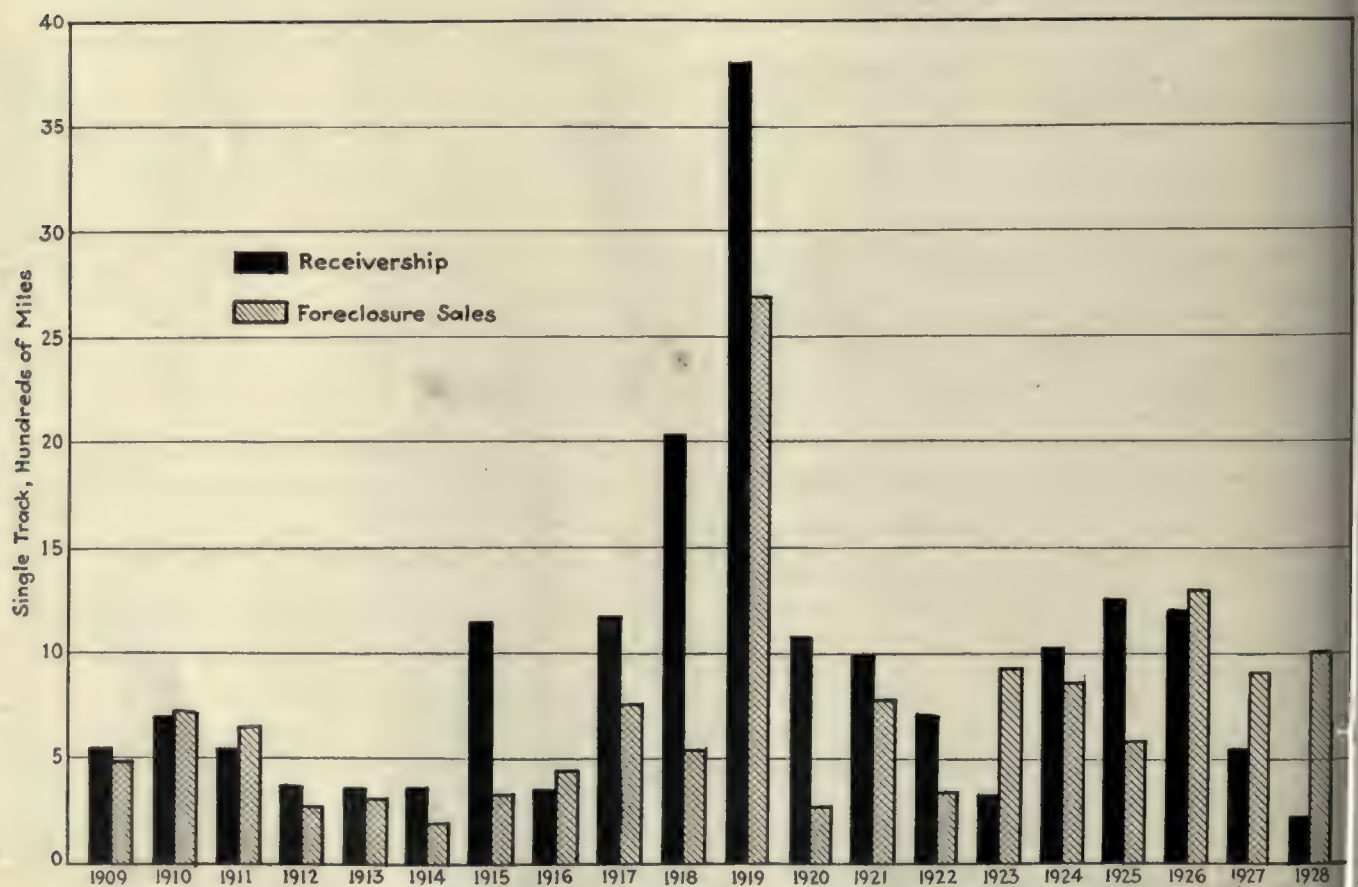
The number of receiverships long drawn out is comparatively small and the roads included are for the most part systems that do not bulk large in mileage. In practically every one of these cases the circumstances appear to be peculiar, but there does seem to exist good reason for the belief that the coming year will see the lifting of these receiverships.

So far as utilities in general are concerned notable progress was made in all departments of public utility financing, engineering and construction, operation and sales. Refinancing at lower interest rates was carried out wherever possible, and the savings made generally have been transmitted to customers in the form of reduced rates. Customer ownership did not assume the importance of former years, largely because much of the financing done during the year was in the form of senior securities to maintain the balance of corporate structures. Thus as J. J. O'Brien, president of H. W. Byllesby & Company, pointed out, sale of junior securities by the electric light and power companies of the country, particularly preferred shares of local operating companies, has become a comparatively easy matter due to the unusual popularity of this type of investment with the public, the problem now being one largely of supplying the demand.



No material change in amount of maturities

Of interest in this connection were several moves not strictly financial under the criterion of the accompanying statistics, but significant nevertheless. The most important, perhaps, was the proposal to merge the Capital Traction Company, the railway lines of the Washington Railway & Electric Company, and the Washington Rapid Transit Company, operating the bus lines in the



Miles of single track going into receivership during 1928 showed material reduction over 1927

Table XI—Receiverships Terminated and Foreclosure Sales During 1928

Receivers Discharged With or Without Foreclosure Sales or Following Abandonment	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates	
Washington-Virginia Railway, Washington, D. C.	40.00	$2,378,300	$5,614,000	None	Sold at foreclosure in 1927. Property now operated as the Mt. Vernon, Alexandria & Washington Railway and the Arlington & Fairfax Railway.
Chicago & Interurban Traction Co., Chicago, Ill.	50.00	1,000,000	1,816,000	None	Road has been dismantled and property sold.
Milford, Attleborough & Woonsocket Street Railway, Springfield, Mass.	29.73	315,000	300,000	None	Property liquidated and receiver discharged.
Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.	44.09	1,200,000	1,500,000	None	Operations abandoned and property sold for dismantling.
Kansas City, Lawrence & Topeka R.R., Kansas City, Mo.	12.00	250,000	400,000	None	Operations discontinued in 1927. Reorganized as Kansas City, Merriam & Shawnee Railroad in 1928, now operating 5 miles.
Helena Light & Railway Co., Helena, Mont.	18.50	935,000	878,000	None	Property dismantled and receiver discharged.
Brooklyn Heights R.R., Brooklyn, N. Y.	5.10	200,000	250,000	None	Operations discontinued.
Geneva, Seneca Falls & Auburn R.R., Geneva, N. Y.	12.00	157,100	507,000	None	Sold at foreclosure and operations discontinued.
Olean, Bradford & Salamanca Ry., Olean, N. Y.	100.00	3,808,000	472,818	None	Operations discontinued.
Penn Yan & Lake Shore Ry., Penn Yan, N. Y.	8.50	94,000	100,000	None	Sold for scrap and receiver discharged.
Cincinnati, Lawrence & Aurora Electric Street R.R., Cincinnati, Ohio	31.67	808,900	None	None	Receivership lifted March 1, 1928.
Pennsylvania & Maryland Street Railway, Meyersdale, Pa.	7.00	190,800	216,000	None	Property sold to Associated Gas & Electric Company in 1926, and is no longer operating. Receiver discharged.
Total of receiverships terminated (12 cos.)	358.59	$11,337,100	$12,053,818	None	
Sold at Foreclosure Sale But Receiver Not Yet Discharged					
Indianapolis & Cincinnati Traction Co., Indianapolis, Ind.	101.00	$3,600,000	$2,600,000	156,000	Sold at receiver's sale.
Detroit United Ry., Detroit, Mich.	613.89	15,375,000	29,745,500	None	Sold at foreclosure sale and reorganized as the Eastern Michigan Railways.
Michigan Railroad Co., Jackson, Mich.	156.71	4,000,000	4,050,000	None	Sold at receiver's sale.
St. Paul Southern Electric Ry., Hastings, Minn.	17.54	658,225	364,900	12,150	Sold at public auction and property now being dismantled.
Total of foreclosure sales without discharge of receivers (4 cos.)	889.14	$23,633,225	$36,760,400	168,150	

District of Columbia. Nothing came of the matter, but it is again subject to legislative consideration.

Then there was the move by which the Public Service Railway and the Public Service Transportation Company, both subsidiaries of the Public Service Corporation of New Jersey, were brought together as Public Service Co-ordinated Transport, the avowed reason being to improve the financial structure, including the possibility of an open-end mortgage under which it would be easier to secure new capital for the extension and betterment of transit facilities. The managerial purpose of the consolidation was to co-ordinate into one operating unit the two companies which had previously operated the cars and the buses.

In Philadelphia the move to have the city condemn the underliers was strictly in accord with the suggestion of the committee on finance of the American Electric Railway Association, looking toward the simplification of financial structures. It is an act without precedent—a friendly action before the Public Service Commission, in which the City Council and officials of the underlying companies joined with the City Solicitor and his staff in petitioning the commission to affix a fair price for the acquisition of the Philadelphia Rapid Transit Company underliers by the city. At the close of the year this matter was still the subject of discussion, but the advisability of the move had come to be generally accepted as essential, except on the part of some holders of the underlying securities, jealous of what they deemed their present favorable rights—rights by no means irrevocably secured under the changing aspects of present-day transportation.

As indicated elsewhere in this issue Judge Finletter, in Common Pleas Court, recently fixed Jan. 19, to hear the petition asking for a court ruling on whether the $138,376,907 which the city proposes to pay for the purchase of the underlying companies of the Philadelphia Rapid Transit may be deducted from the city's indebtedness in ascertaining its borrowing capacity. To date Controller Hadley has failed to join in the court action. The city intends to issue bonds in the amount needed to acquire the franchise of the underliers. The company now pays $8,822,845 annually to the subsidiaries as rentals, but Mr. Hadley desires that assurances be made to the city that the transit company will continue to pay rentals sufficient to meet bond sinking-fund and interest charges.

One or two moves saw the further segregation of railway properties from light and power properties with

NOT even the most optimistic street railway man believes the industry is out of the woods yet or anywhere near it, but they are all now certain that any idea of extinction was merely a nightmare, that the bottom has been touched and the way is now upward.—*Investment Bankers' Association.*

Table XII—Electric Railway Receiverships as of Dec. 31, 1928

	Year of Receiver-ship	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates
Illinois					
Chicago Railways, Cnicago	1926	597.06	$100,000	$103,854,255	None
Peoria Railway Terminal Co., Peoria (1)	1922	25.28	1,000,000	2,444,000	None
Indiana					
Chicago, South Bend & Northern Indiana Ry., South Bend	1927	125.00	7,500,000	4,955,500	None
Evansville & Ohio Valley Ry., Evansville	1927	70.00	511,985	1,960,900	None
Indianapolis & Cincinnati Traction Co., Indianapolis (2)	1925	101.00	3,600,000	2,600,000	$156,000
Southern Michigan Railway, South Bend	1928	32.05	2,000,000	1,145,000	None
Union Traction Co. of Indiana, Anderson	1924	445.50	11,500,000	15,858,000	None
Iowa					
Des Moines City Ry., Des Moines	1927	103.31	3,019,100	4,821,000	None
Mississippi Valley Electric Co., Iowa City	1926	6.00	592,835	184,500	None
Kansas					
Joplin & Pittsburg Ry., Pittsburg	1924	94.52	7,000,000	3,078,500	None
Missouri & Kansas Railway, Kansas City	1928	20.03	1,000,000	655,000	None
Union Traction Co., Coffeyville	1927	85.00	700,000	1,500,000	None
Kentucky					
Owensboro City R.R., Owensboro	1923	12.50	75,000	400,000	None
Massachusetts					
Milford & Uxbridge Street Ry., Milford (1)	1926	35.00	540,000	500,000	None
Michigan					
Detroit United Ry., Detroit (3)	1925	613.89	$15,375,000	29,745,500	None
Houghton County Traction Co., Houghton	1921	32.15	957,200	660,000	None
Michigan Railroad Co., Jackson (2)	1924	156.71	4,000,000	4,050,000	None
Minnesota					
Minneapolis, Anoka & Cuyuna Range Ry., Minneapolis	1926	29.25	300,000	284,000	None
St. Paul Southern Electric Ry., Hastings (4)	1918	17.54	658,225	364,900	$12,150
Wahpeton-Breckenridge St. Ry., Breckenridge	1925	1.00	42,500	None	None
Missouri					
Hannibal Railway & Electric Co., Hannibal	1927	6.50	111,165	102,500	None
Southwest Missouri R.R., Webb City	1926	90.00	5,000,000	2,341,000	None
New Jersey					
Atlantic & Suburban Ry., Atlantic City	1928	16.00	150,000	691,000	None
New York					
Auburn & Northern Electric R.R., Syracuse	1928	(a)	(b)	236,000	None
Binghamton Ry., Binghamton	1925	47.31	978,895	2,807,200	None
Buffalo & Erie Ry., Fredonia	1928	96.23	1,450,500	910,300	$37,479
Buffalo & Lackawanna Traction Co., Buffalo	1918	8.80	55,000	1,000,000	None
Eighth & Ninth Avenues Ry., New York	1927	37.27	232,000*	None	None
Empire State R.R., Syracuse	1927	70.00	2,950,000	2,750,000	None
Hamburg Ry., Buffalo	1920	21.72	None	750,000	$4,000
Ithaca Traction Corp., Ithaca	1924	12.72	400,000	763,000	$25,000
Manhattan & Queens Traction Corp., Long Island City	1917	21.66	20,000	None	None
New York & Queens County Ry., Jackson Heights	1923	35.07	3,235,000	1,300,000	None
Ogdensburg Street Ry., Ogdensburg	1922	7.74	150,000	150,000	None
Second Avenue R.R., New York	1908	23.96	1,862,000	5,682,000	$3,140,000
Staten Island Midland Ry., Brooklyn	1920	28.68	1,000,000	1,000,000	$3,000
Steinway Ry., New York	1922	31.11	None	1,500,000	None
Syracuse, Lake Shore & Northern Ry., Syracuse	1928	(a)	(b)	2,496,000	None
Westchester Street R.R., New York (1)	1920	16.32	700,000	168,000	None
Ohio					
Indiana, Columbus & Eastern Traction Co., Springfield (5)	1921	153.23	4,025,000	7,900,000	$65,000
Springfield Ry., Springfield	1928	40.54	1,500,000	1,335,400	None
Oklahoma					
Lawton Railway & Light Co., Lawton	1927	6.31	100,000	100,000	None
Tulsa Street Ry., Tulsa	1925	23.00	580,000	771,000	$25,000
Pennsylvania					
Schuylkill Ry., Girardville	1927	34.00	400,000	1,550,000	None
Utah					
Salt Lake & Utah R.R., Salt Lake City	1925	97.55	5,043,700	2,532,320	$200,000
Washington					
Puget Sound Electric Ry., Tacoma	1928	57.10	3,116,200	7,322,000	None
Net receiverships Dec. 31, 1928 (45 cos.)	....	3,585.61	$93,531,305	$225,218,775	$3,667,629

(a) Included with Empire State R.R. figures.
(b) Information not available.
(1) Sold at foreclosure in 1927. Receiver not yet discharged.
(2) Sold at receiver's sale.
(3) Sold at foreclosure and reorganized as Eastern Michigan Railways. Receiver not yet discharged.
(4) Property being dismantled.
(5) Merged with Cincinnati, Hamilton & Dayton Ry. Receiver not yet discharged.
* 58,000 shares. No par value. Based on market quotation.

which they had heretofore been identified, but under circumstances that gave every indication of the more intensive development of the railways under segregated operation. Outstanding examples of this tendency were furnished in the cases of the railways at Roanoke and Lynchburg. On the other hand, several railway systems in the Southeast, notably the Augusta-Aiken Railway & Electric Company and others, were brought into the system of the Southeastern Power & Light Company, surely a company with greater resources of management, money and men than at the command of these companies under previous ownership. Somewhat similar in import was the passage of the control of the Spokane United Railways to the American Power & Light Company along with the Washington Water Power Company, by which the railways were previously controlled. Similarly the Indiana, Columbus & Eastern and the Lima-Toledo properties passed to the Cincinnati, Hamilton & Dayton Railway. Also last summer the so-called Phillips interests took over the lines of the New York State Railways in Rochester and Syracuse and have since concluded negotiations by which the Schenectady Railway and the United Traction of Albany pass to their control, the latter system previously under the control of the Delaware & Hudson Company with L. F. Loree as its head.

Attention should be called to the fact that the Cincinnati Street Railway has placed its $50 par capital stock on a $3 annual dividend basis, against $2.50 paid previously and that the Montreal Tramways, paying $10 a share per year, recently offered holders additional rights on the basis of one new share for every six held at a price of $150 a share.

Restoration of the credit situation of the electric railways has been a slow process—painfully slow, for instance, compared with that of the electric light and power companies. Ten years ago some of the soundest utility organizations were unable to do better than finance with 8 per cent preferred stock and 7 per cent bonds, while direct liens on power houses, as one commentator has pointed out, were placed with issues that carried a 7 per cent coupon. In view of the favorable terms under which light and power companies are now able to do their financing, sight sometimes is lost of the facts of the period of high money rates only a few years removed. It should not be assumed, however, that terms for financing, similar to the favorable ones which prevail at present in the light and power field, are likely soon to be realized by strictly electric railway properties. On the other hand, as the report of the public service securities committee of the Investment Bankers' Association pointed out, while not even the most optimistic street railway men believe the industry is out of the woods or anywhere near it, they are now certain that the bottom has been touched and the way is now upward. And the financial record for the year would indicate this to be true.

Electric Railway Fares and Wages

At Highest Point in 1928

These factors show increases similar to those of 1927. Commodity prices, construction costs and operating materials costs on slight upward swing during the year, but with no marked change from general level course of past five years

By Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

DURING the year 1928 the weighted average street railway fare in the United States increased from 7.57 cents to 7.71 cents. The measure of the 1928 increase in average fare, about 2 per cent, is almost exactly the same as the increase during the preceding year. The 1928 change in average fare was principally due to increases in Baltimore (two during the year), Los Angeles, St. Louis, Schenectady, Savannah, Portland, Maine, Youngstown and Sacramento. The effect of these changes on the weighted average fare is in the order in which the cities have been named. Other changes have had much smaller influence on the weighted average fare, on account of either the smallness of the fare change or the small population involved.

Changes in average fares during the three years 1926 through 1928, inclusive, are shown on the first of the accompanying charts. Two sets of averages are there shown, namely, the weighted average fare figures as computed by the writer, and the unweighted average cash fare figures of the American Electric Railway Association. In the Richey index, all cities in the United States of more than 50,000 population are included, and in computing the average the fares are weighted in accordance with the population of the cities; further, for each city where reduced rate tickets are used, an average fare is used which includes both cash and ticket rates; children's or workmen's tickets, or other forms of special reduced rates are not considered. New York City is excluded on account of its large population and abnormally low street railway fare. The American Electric Railway Association fare index includes all cities of more than 25,000 population and is an average of cash fares only. It is not weighted, so that each city is of equal importance in the final average, regardless of its size and the number of patrons affected by the fare.

Wage Increases on Seven Railways During Past Year

Indexes of the average wages of electric railway trainmen during the years 1926 through 1928, inclusive, are shown in Fig. 2. Here again two indexes are shown, both using 1913 as a base. In both indexes the maximum hourly rates of trainmen in two-man service are used. The Richey index includes wages on 137 street and interurban railways, and is weighted in accordance with the number of trainmen employed on such railways. The American Electric Railway Association index uses 85 railways and is unweighted with respect to the number

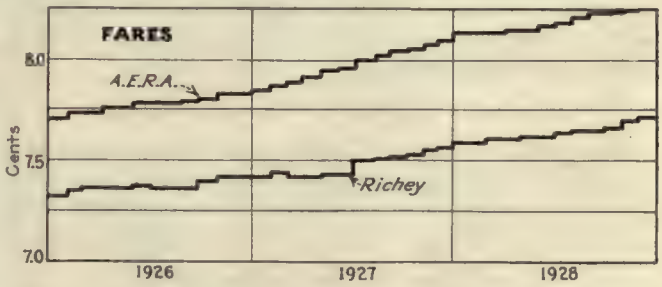


Fig. 1—Street Railway Fares (1913 = 4.8425 cents)

of men employed. Since the roads employing the greater number of men have had, as a rule, made larger increases in hourly rates since 1913, the Richey weighted index stands somewhat higher than the unweighted A.E.R.A. index, as is indicated by Fig. 2. Both indexes

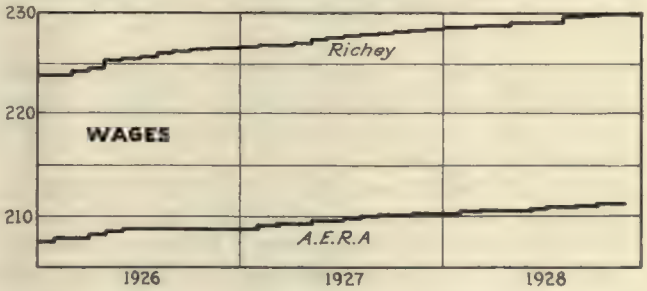


Fig. 2—Electric Railway Wages (1913=100)

show about the same measure of increase in trainmen's wages during the last year and during the last three years. The wage changes during 1928 which have principally affected the Richey index, and in the order of their effect on that index, were at Chicago, Cleveland, Baltimore, Pittsburgh, Atlanta, Eastern Massachusetts Street Railway, and Cincinnati.

As pointed out in last year's article on this subject, the increase in electric railway wages, amounting to 130 per cent since 1913, is out of all proportion to the increase in the cost of living, which, as measured by the

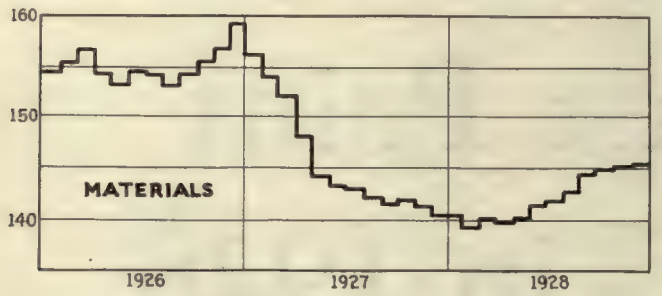


Fig. 3—Electric Railway Operating Materials (1913=100)

index of the National Industrial Conference Board, had increased only 63 per cent between 1914 and November, 1928. The "real wages" of electric railway trainmen as compared with 1913 and 1914 may be represented by an index number of 141, which is the present index of wages (230) divided by the present index of the cost of living (163). This means that the average electric railway trainman in the United States is now able to increase his standard of living 41 per cent over that of 1914. A similar computation a year ago showed the index of "real wages" of electric railway trainmen as 138, compared with the present 141, which indicates an increase in "real wages" of about 2 per cent during the past year. During this year, again, this has been due partly to increases in wages, but also in some measure to a decline in living costs.

Changes in Construction Cost Slight

The trend of costs of electric railway operating materials has been slightly upward during the past year, the index for December being 145.5 as compared with

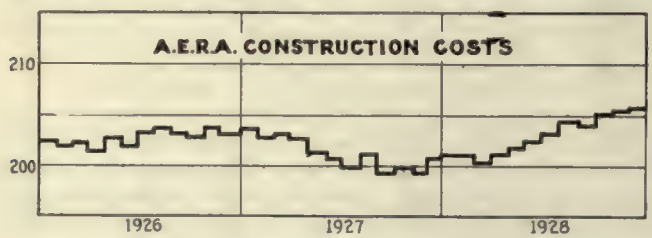


Fig. 4—A.E.R.A. Electric Railway Construction Costs (1913=100)

that of 140.6 for December, 1927. This rise is small compared with the drop which occurred during the first half of 1927 from the 1926 average of 155.0, as is indicated in Fig. 3.

Electric railway construction costs have remained at a remarkably uniform level during the past 5½ years, as indicated by the American Electric Railway Association Construction Cost Index, shown in Fig. 7, and on a larger scale for the past three years by Fig. 4. This index of electric railway construction costs may be compared with the construction cost index of the *Engineering News-Record,* as shown in Fig. 5, for the past three years. The latter is an index of general construction costs and includes structural steel and other building materials in a considerably greater weighting than such materials are used in the Electric Railway Construction Cost Index. The electric railway index is somewhat stabilized by the heavier weighting of steel rail, the price of which has remained constant since October, 1922; it has, however, a very much heavier weighting of the common labor item, the average cost of which increased nearly 2½ per cent during 1928.

The Wholesale Commodity Index of the United States Bureau of Labor Statistics is shown for the past three years in Fig. 6. As was noted in the article on this subject a year ago, this index, which previously had been calculated on the base of 1913 = 100, was discontinued on that base in August, 1927, and since then has been calculated on the base of 1926 = 100. The revision also included an increase in the number of commodities (from 404 to 550) and the adoption of a weighting somewhat different from that previously employed. The figures shown in the tabulation herewith include this index on its revised base for the years 1913 through 1928.

Five of the indexes mentioned above have been grouped together for the years 1914 through 1928, inclusive, in the chart shown as Fig. 7. The indexes there shown are: (1) The American Electric Railway Association Index of Electric Railway Construction Costs, (2) the Richey Index of Electric Railway Operating Materials Cost, (3) the Richey Index of Electric Railway Wages, (4) the Richey Index of Street Railway

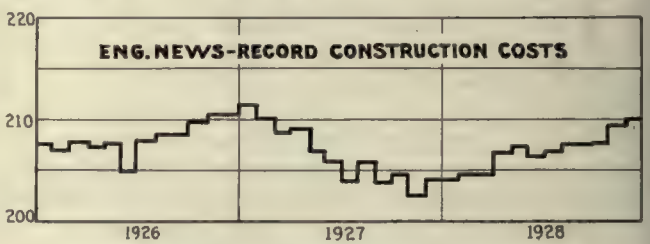


Fig. 5—Engineering News-Record Construction Costs (1913=100)

Fares, and (5) the U. S. Bureau of Labor Statistics Index of Wholesale Commodity Prices. The tabulation of numerical values includes these five and also the *Engineering News-Record* Index of General Construction Costs. The tabulation shows the averages of these indexes by years from 1913 through 1928, and also the monthly values from January, 1925, through 1928. It will be noted that all of the indexes shown in Fig. 7 and in the tabulation are on the base of 1913 = 100 except the Wholesale Commodity Price Index, which, as above noted, is on the base of 1926 = 100.

All of the above-mentioned indexes are included in a series of index numbers compiled regularly by the writer under the heading of "Conspectus of Indexes" and published monthly by Electric Railway Journal in its Financial and Corporate section. The Conspectus also includes the Bradstreet Wholesale Commodity Index, the U. S. Bureau of Labor Statistics Index of Retail Food Costs, the National Industrial Conference Board's Index

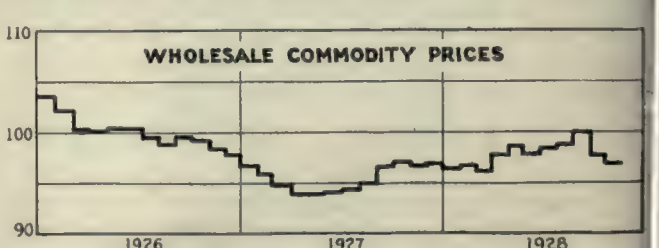


Fig. 6—Bureau of Labor Statistics Wholesale Commodity Prices (1926=100)

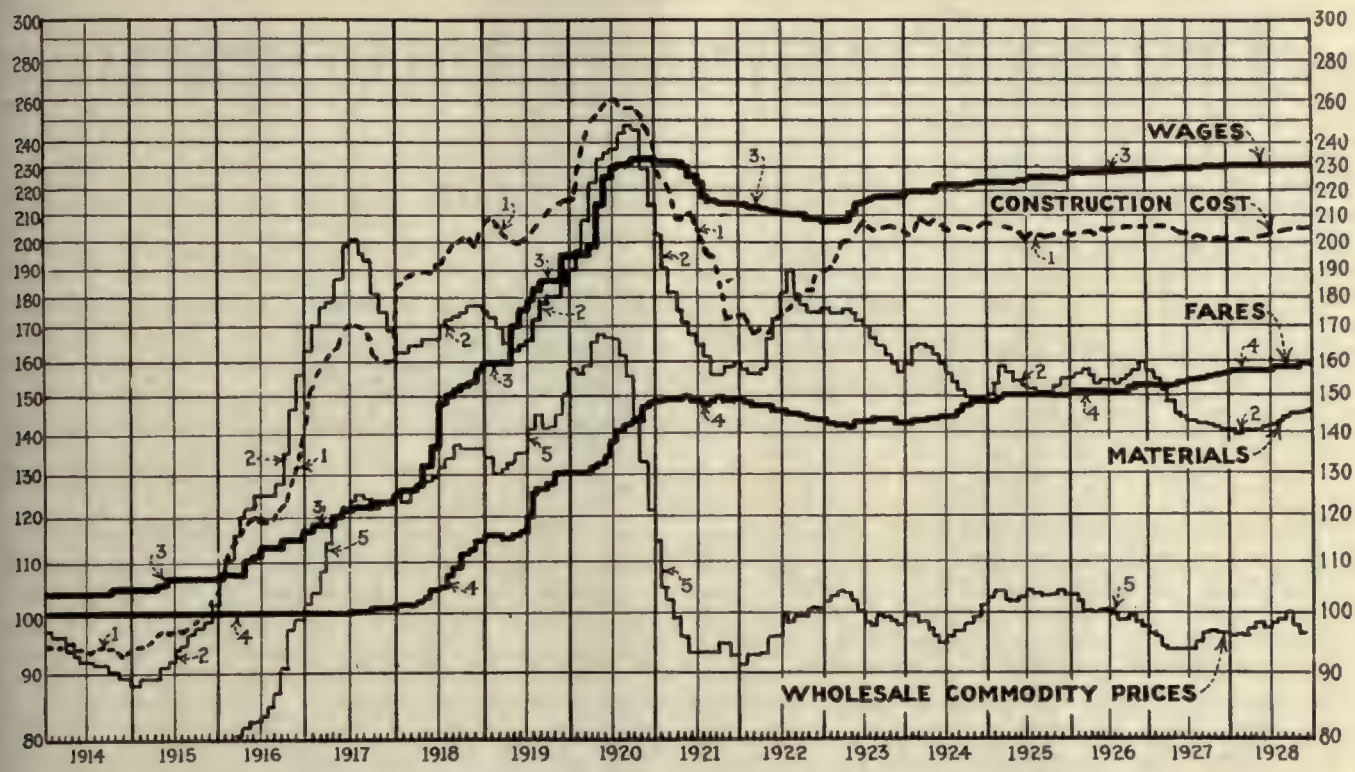


Fig. 7—Trend of Construction and Operating Costs, Wages and Fares 1914-1928

1. Electric railway construction costs (according to American Electric Railway Association).
2. Electric railway operating materials costs (Richey). Includes fuel for power; weighted according to average use in maintenance and operation.
3. Electric railway wages (Richey). Maximum hourly wages of platform men, weighted according to number of men.
4. Street railway fares (Richey). U. S. cities (except New York); weighted according to population.
5. Wholesale commodity prices (U. S. Bureau of Labor Statistics).

AVERAGE FARES AND COSTS 1913-1928

Base 1913 = 100

	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Construction Costs (Am. Elec. Ry. Assn.)	General Construction Costs (*Eng. News-Record*)	Wholesale Prices, All Commodities* (U. S. Bur. Lab. Stat.)
1913.....	100.0	100.0	100.0	100.0	100.0	69.8
1914.....	100.0	92.6	104.2	94.0	88.6	68.1
1915.....	100.1	93.5	106.2	97.3	92.6	69.5
1916.....	100.1	126.2	111.6	119.8	129.6	85.5
1917.....	100.3	181.9	120.6	162.7	181.2	117.5
1918.....	106.2	168.8	140.5	192.5	189.2	131.3
1919.....	120.7	172.2	174.0	205.1	198.4	138.6
1920.....	137.2	224.6	217.3	244.7	251.3	154.4
1921.....	148.9	169.9	222.7	200.7	201.8	97.6
1922.....	146.0	170.0	210.0	175.2	174.4	96.7
1923.....	142.9	168.0	212.1	200.2	214.1	100.6
1924.....	149.2	156.0	219.2	204.6	215.4	98.1
1925.....	150.2	153.1	222.2	202.4	206.7	103.5
1926.....	152.2	155.0	225.3	202.6	208.0	100.0
1927.....	154.6	145.7	227.5	201.1	206.2	95.4
1928.....	157.7	142.2	229.3	203.1	206.8	.....

*Base 1926 = 100.

MONTHLY INDEX OF FARES AND COSTS FOR PAST THREE YEARS

Base 1913 = 100

1926	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Construction Costs (Am. Elec. Ry. Assn.)	General Construction Costs (*Eng. News-Record*)	Wholesale Prices, All Commodities* (U. S. Bur Lab. Stat.)
January....	151.2	154.3	223.8	202.2	207.2	103.6
February...	151.8	155.3	223.8	201.9	206.6	102.1
March.....	151.9	156.4	224.1	202.0	207.6	100.4
April.....	151.9	154.2	224.7	201.3	207.0	100.1
May.....	151.9	153.1	225.4	202.4	207.3	100.5
June.....	152.1	154.4	225.5	201.9	204.8	100.5
July.....	152.0	154.1	225.7	203.2	207.8	99.5
August.....	152.0	153.1	225.9	203.6	208.3	99.0
September..	152.0	154.2	226.1	203.2	208.3	99.7
October....	152.8	155.4	226.2	202.9	209.8	99.4
November..	153.2	156.6	226.3	203.7	210.8	98.4
December..	153.2	159.2	226.3	203.2	210.8	97.9
1927						
January....	153.2	156.0	226.6	203.5	211.5	96.6
February...	153.8	154.0	226.7	202.9	210.2	95.9
March.....	153.4	152.1	226.7	203.0	208.8	94.5
April.....	153.4	148.0	226.9	202.6	209.0	93.7
May.....	153.6	144.2	227.4	201.0	206.8	93.7
June.....	153.6	143.0	227.5	200.6	205.6	93.8
July.....	155.2	142.9	227.8	199.9	203.7	94.1
August.....	155.3	142.1	227.9	200.9	205.5	95.2
September..	155.5	141.6	228.0	199.4	203.6	96.5
October....	155.7	141.8	228.2	199.8	204.4	97.0
November..	156.1	141.3	228.3	199.4	202.0	96.7
Decemoer..	156.2	140.6	228.4	200.7	203.9	96.8
1928						
January....	156.7	140.6	228.6	200.9	203.9	96.3
February...	156.7	139.5	228.7	200.9	204.6	96.4
March.....	157.2	140.1	228.8	200.5	204.6	96.0
April.....	157.2	140.0	228.8	201.2	206.4	97.4
May.....	157.3	140.4	229.2	201.9	207.0	98.6
June.....	157.3	141.4	229.2	202.7	206.2	97.6
July.....	157.7	141.8	229.2	203.3	206.6	98.3
August.....	158.0	142.5	229.7	204.5	207.3	98.9
September..	158.1	144.2	229.7	204.4	207.3	100.1
October....	158.2	144.9	229.9	205.5	207.7	97.8
November..	158.9	145.1	229.9	205.7	209.5	96.7
December..	159.3	145.5	229.8	205.1	210.2	.....

*Base 1926 = 100.

of Cost of Living, the *Electrical World's* Industrial Activity Index, an index of bank clearings outside of New York City, and data on the number and total liabilities of business failures as reported monthly by Bradstreet.

In the annual statistical numbers of the JOURNAL (the first or second issue in January each year beginning in 1923) charts and tables have been presented similar to those shown in this article. The methods used in the computation of the indexes shown in Fig. 7 were described fully on page 37 of the JOURNAL for Jan. 2, 1926, in an article which also contained a tabulation showing the numerical values of the various indexes monthly from January, 1920, through December, 1925. The earlier monthly numerical values, from January, 1914, through December, 1919, may be found on page 19 of the JOURNAL for Jan. 5, 1924.

Trade Prospects Favorable

for the New Year

Car and equipment purchases expected to increase during the coming year. Larger demand for track material probable. Heavy sales of bus equipment likely to continue. General business conditions good

TRADE conditions in the electric railway industry were unsettled during the year 1928 and could scarcely be called as favorable as in 1927. Fewer cars were purchased, and, in almost every instance, producers of car equipment and accessories reported a decrease in sales. On the other hand some divisions of the industry reported substantial increases during the year. There were heavier sales of buses and bus equipment, shop equipment, and track materials and supplies, as well as of line material and power equipment.

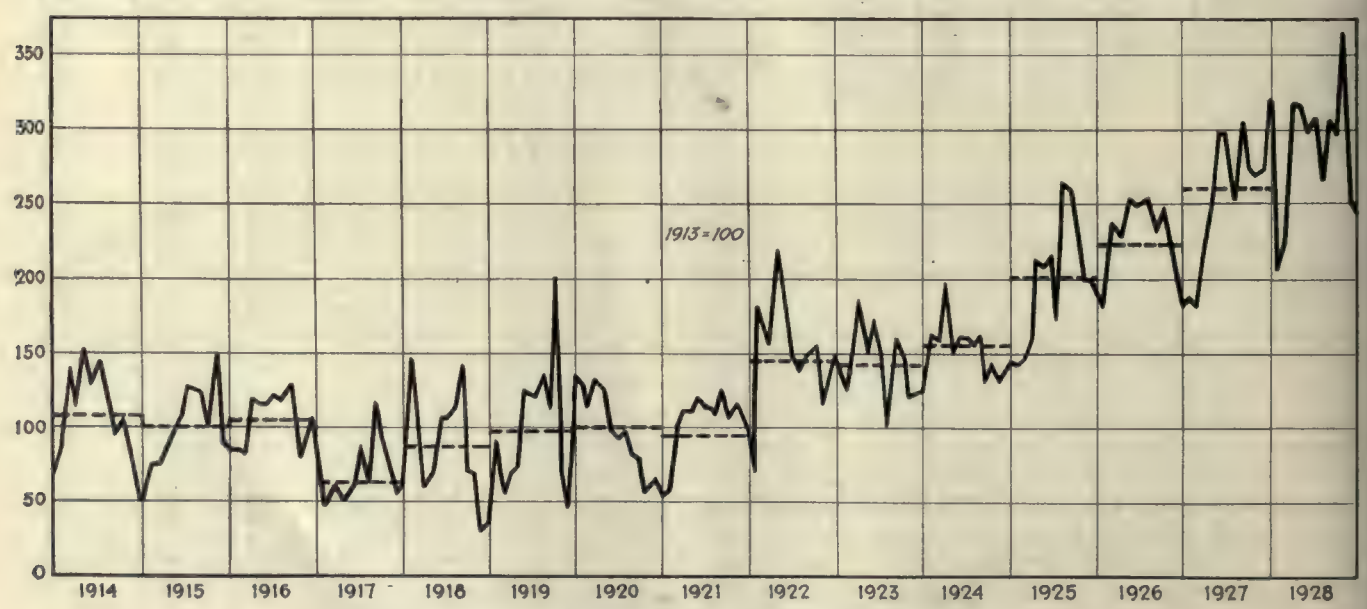
For several years there have been deferred purchases of cars and equipment. It has been predicted that this situation could not last indefinitely and it is now the opinion of many that the release of these purchases will occur this year. There has been much new development during the past year in cars and car equipment. As soon as the full value of these and other improvements now under way is realized, there should be an accelerated trend toward rehabilitation.

Many Improvements in Design

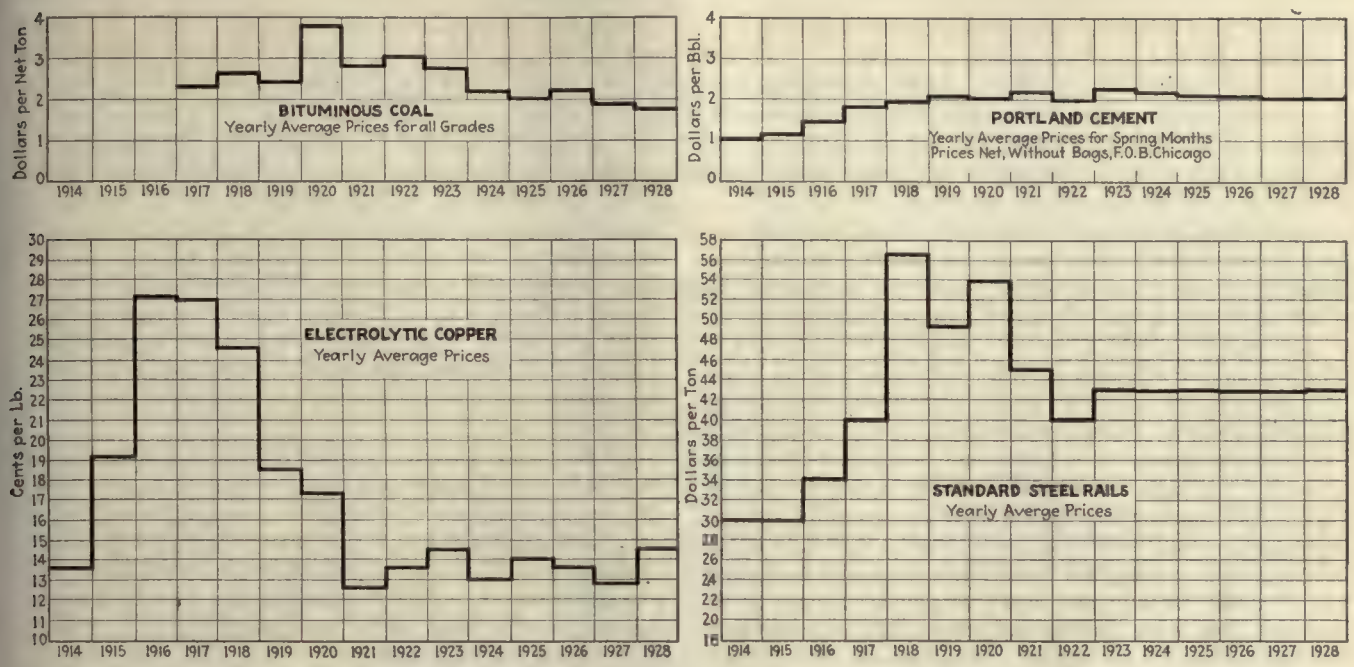
While the year 1928 in the railway equipment field has not resulted in the amount of business anticipated and hoped for, development effort by the manufacturers has been noteworthy. A number of companies have spent large sums for the improvement of their products. It appears that this research toward improvement will continue throughout the coming year, as the budgets for practically all of the larger companies show amounts for improvements that either equal or are greater than the amounts allotted last year. However, during this time, the manufacturers have had an opportunity to improve and perfect motors, drives and other types of equipment. Requirements have undergone a change over two or three years and are continuing along the lines instituted in 1927, in that higher speed, lighter weight and higher rates of acceleration and braking are required. A marked increase is anticipated in the demand for electric railway vehicles, and, necessarily, parts associated therewith. With the improvements that are now apparent in electric railway cars, it is anticipated that cars will be ordered in considerable quantities during the year 1929. Estimates on the increase in sales during 1929 made by various car equipment manufacturers on the products which they sell, range from 5 to 50 per cent of the 1928 sales.

Purchases of car seats and accessories fell off during the year. However, developments in car seating have been made, and it is indicated that there will probably be an increase in sales this year. The credit situation is satisfactory and it is believed that prices will have a tendency to go higher.

No particular changes occurred in 1928 in line mate-



Index of general construction volume is highest in fifteen years



No great changes occurred in price trends of four basic industries

rials. The credit situation is satisfactory and prices have been steady, although the advance in copper toward the end of the year necessitated some increases. It is claimed that electric railways are becoming more receptive to new products which are fundamentally sound, and that there is apparently more recognition of value in the product and a keener realization that the first cost is not the total cost. It is probable that there will be a continued change in trade conditions during 1929, affecting these products. Several manufacturers report greater sales of track material during the year 1928 than for some years and are expecting a further increase during the coming year. Plant capacity is being increased, and additional developments are planned.

Bus Sales Increased

The sale of buses and bus equipment to electric railways increased during the year. Manufacturers of buses reported various increases up to 450 per cent of the 1927 sales. While this represents a maximum for one company only, a marked increase in sale of buses to electric railways is anticipated and a number of manufacturers are increasing their plant production capacity.

Sales of bus equipment went up 5 to 100 per cent during the year 1928, and increases are anticipated by various manufacturers for the coming year, ranging from 10 to 1,000 per cent of last year's sales. Development budgets for 1929 are materially greater than for 1928, and many plant production capacity increases will be made.

Increased purchases of shop equipment during the year are reported. Development in this type of equipment is expected throughout 1929 and further increases in sales are expected.

A representative number of railways indicate in their returns that approximately 33 per cent of their materials and supplies are purchased locally, that is, from local dealers, jobbers, distributors, or manufacturers as distinct from manufacturers selling to the industry through direct representatives or sales agencies. Such supplies as coal, oil and waste are almost always bought in this manner. Of course, this figure varies considerably according to the location of the railway.

Deliveries indicate that manufacturers are maintaining stocks for prompt shipment. The average time of delivery for car equipment, given by a number of railways, was 38 days, bus equipment 14 days, line material 23 days, track material 20 days, power equipment 35 days, and shop equipment 18 days. Only in a few remote instances of track material purchases was delivery indicated as very slow.

Supplies purchased on contract by the companies replying average 25 per cent of their total. Purchases on contract of these companies were approximately, electrical supplies, 56 per cent; gas, oil, and grease, 88 per cent; seating material, 21 per cent; brakeshoes, 52 per cent; lamps, 44 per cent. So far as reported, welding gas, tires, coal, line material, ties, paint and maintenance materials were purchased on contract to a limited degree.

Of the railways reporting on trade conditions, 53 per cent had a decrease in inventory. In value, the average decrease was approximately 7 per cent of the total material and supplies account. Sixty-nine per cent of the companies reporting had an inactive stock of approximately 8 per cent of their material and supplies accounts, but 30 per cent of them had an average decrease of 12 per cent in their inactive stock during the year.

The price advance on most products has been slightly upward, according to the purchasing agents. The principal increases in materials were: Copper, 12 per cent; lumber, 8 per cent; insulated copper wire 8 to 10 per cent; and anthracite coal 1 per cent. The principal decrease in prices was for brakeshoes, 3.7 per cent. Slight decreases were noted in lead and tin. The average price of all grades of coal has decreased during the year.

General Business Conditions Good

The general business situation at the turn of the year is distinctly encouraging and fully warrants the expectation that the prosperity which the country has enjoyed will continue. Basic conditions in industry and trade seldom have been so favorable after a long period of high

activity. This optimism, of course, must be qualified by a word of caution as to the financial markets. No large volume of purchasing power is created by the advance in security prices except as it reflects proportionate increased earnings in fact or in immediate prospect. On the contrary, a pronounced market reaction would impair confidence and affect business adversely.

The rise in money rates is due largely to the policy of the Federal Reserve Board. A definite cessation of the speculative boom would probably cause a downward revision of money rates. However, the unequal distribution of the world's gold makes it difficult to anticipate a return to the easy money situation of the last seven years.

In general, the course of trade has been upward during the year, and with record production in the iron and steel, building and automobile industries, the demand has kept stocks of manufactured goods at lower levels than in 1927. In consequence, the commercial situation appears thoroughly sound despite the sustained industrial activity. Wages continue high and unemployment is at a minimum. The average weekly earnings for wage earners at the close of 1928 were the highest since 1920. Corporation earnings advanced materially over those in 1927. Retail trade exceeded that of the year previous by a wide margin and the purchasing power of the general public, both urban and rural, was substantially increased.

Good Outlook for Electric Railways

In the street railway industry, despite the readjustment which has been going on for some years, there is apparently a very general movement for the fifteen improvements of street railway properties, more particularly in the larger cities. However, this demand is not confined entirely to the larger cities requiring mass transportation. This is exemplified in the modernization program undertaken at Phœnix, Ariz.

Major car orders during the year included Montreal Tramways, 151 double-truck cars and 2 articulated units; Cincinnati Street Railway, 104 cars; Detroit Street Railway, 100 cars; and Cleveland Railway, 50 double-truck cars and 28 articulated units. Among important modernization programs carried out during the year was that completed by the Kansas City Public Service Company in installing modern control equipments on existing cars, and the Dallas Railway & Terminal Company by placing in service 17 new light-weight cars. Other companies making major improvements during the year include the Delaware Electric Power Company, the Indianapolis and Southeastern Railway and the Community Traction Company. Experiments on new rolling stock are being conducted by a number of railways in various sections of the country. During the coming year the city of New York is expected to commence the purchase of cars for its new subway system, the first order probably being for about 300 units. A number of large track projects were completed during the past year and good-sized programs for reconstruction and extensions are being announced for 1929.

While electrification of steam railroads during the past year was the greatest for many years, still greater are the prospects for the coming year. Among these projects on which plans are practically completed, is included the Pennsylvania Railroad electrification between New York and Philadelphia. The Cleveland Union Terminal project has been under way for several years and will probably near completion this year.

Electrification plans which have been definitely made include electric suburban service from Hoboken, New Jersey on the lines of the Delaware, Lackawanna & Western Railroad and from Philadelphia, Pa., on the Reading Railroad. Several other railways have definitely let it be known that they are actively engaged in making studies for electrification. The capital expenditures in prospect as a result of these undertakings will total hundreds of millions of dollars.

With few exceptions, optimism prevails in the electric railway industry. There should be additional equipment business in the year 1929. There is no doubt that the public in general is appreciating, as it never has before, the advantages to be secured by up-to-date and satisfactory street railway operation and are reflecting this confidence in better franchise and rate-of-fare conditions. The railway industry has had time to study and try out these new improvements and should now be in a position to go ahead with a program of purchasing new equipment during 1929.

Comments of a Bus Manufacturer

WE BELIEVE that the electric railway industry has passed the lowest ebb of its depression period and that there is a definite upward swing in progress affecting confidence as a result of increased earnings which should, no doubt, operate as a favorable factor in regard to bus and car purchases during 1929.

Comments of an Electrical Manufacturer

THE electric railway industry at present is in a much more satisfactory position than it has been for a decade. The principle is now generally accepted that only by means of a system in which the cars and the buses are properly coordinated under a single expert and responsible management can efficient urban transportation be secured and an effective remedy for traffic congestion be found. The automobile, which seemed at one time to threaten extinction of the electric railways, has brought about conditions which make the electric railway even more essential.

Comments of an Equipment Manufacturer

WE FIND the electric railways more and more receptive to new products which are fundamentally sound and which give promise of giving the railways a better and longer return on their investment. There is apparently more recognition of value in the products and a keener realization of the fact that the "first cost is not the real cost."

News *of the* Industry

Need for New Fare Stressed in Cleveland

A demand for an arbitration on a zone-fare system was made on the City Council of Cleveland, Ohio, recently by the Cleveland Railway. In a letter to the Council, Joseph H. Alexander, president of the company, pointed out that since September the interest, or fare barometer fund, has been below $500,000, which, according to the Tayler grant, is *"prima facie* evidence of the necessity for an increase in fare" to the next step as provided by the Tayler grant scale. The present rate of fare is 7 cents cash, eight tickets for 50 cents; the next step calls for 8 cents cash, seven tickets for 50 cents.

Mr. Alexander then called attention to Section 24 of the Tayler grant. This states that whenever an increase is proposed other than to the next step in the Tayler grant, the proposal may be arbitrated. He pointed out that last June the company had proposed consideration of a zone plan, but that the Council had never taken any action. Accordingly he notified the city that the company desired to arbitrate the question and had appointed Attorney Charles Higley as its arbitrator.

The Council has always balked at any suggestion of a zone plan. It is preparing to resist the demand for an arbitration on the ground that a zone plan is not a proper subject for arbitration and that the proposal of the railway is too vague to arbitrate. Should the Council agree to arbitrate, it has until Jan. 16 to name its arbitrator. If the Council refuses to appoint an arbitrator, the railway is prepared to name a representative for the city, as provided in the arbitration clause of the Tayler grant.

The big stumbling block to a zone system of fares has been the separate suburban contracts. In the past six months, however, two of the suburbs, East Cleveland and Cleveland Heights, have been put on a zone plan, paying a differential of 2 cents for a thorough ride from the suburb to the city. Lakewood car riders still have the same rate of fare as Cleveland and a 3-cent local rate.

The proposal of the Cleveland Railway is to establish an inner and outer zone, the boundary to be at a convenient point from 4 to 5 miles from the Public Square. The rate within each zone would be determined by the condition of the interest fund, as at present, plus a differential, similar to that now in effect in East Cleveland, for a through ride.

As pointed out in President Alexander's letter, under this system only a few Cleveland riders would be required to pay an increase, while if a zone system is not adopted the fare will have to go to 8 cents.

C. M. Ballou, traction commissioner, told the Council that an 8-cent fare could be averted by permitting the company to operate one-man cars on a number of lines.

Petitions for an initiated ordinance to grant the Cuyahoga Subway Company a franchise in Cleveland, Ohio, were filed with the Cleveland City Council on Dec. 31 by Charles H. Hubbell, former candidate for Mayor of Cleveland and one of those interested in the subway company. M. F. Bramley, president of the Cuyahoga Subway Company, declared the filing of the petitions was unauthorized. Mr. Hubbell replied that he was disgusted with the delay and had filed the petitions to force action on the subway proposition before the Cleveland Railway and Van Sweringen interests presented a proposed $100,000,000 merger of surface, underground and transit lines on private right of way.

City Clerk Fred W. Thomas ruled that the petitions would have to stay on file and go through the usual procedure of being checked and considered by the Council.

Penn-Ohio System Wins Brady Medal

Awards distributed at meeting of Metropolitan Section of A.E.R.A., in New York. To be competed for again next year

AT A MEETING of the Metropolitan Section of the American Electric Railway Association held in New York City on Jan. 4, the feature was the presentation of the Anthony N. Brady Awards for Safety to the Penn-Ohio System, Youngstown, Ohio, the Tampa Electric Company and the Tidewater Power Company, Wilmington, N. C., with honorable mention to the Louisville Railway and the El Paso Electric Company. In addition to a large representation from the membership of the section there were present a number of prominent electric railway executives from various parts of the country.

Arthur Williams, president of the American Museum of Safety, expressed the belief that the work of the electric railways along the lines of accident prevention has been exceedingly valuable in re-establishing them in the estimation of the public.

J. P. Barnes, president of the American Electric Railway Association, told of the effect upon the personnel of his property, the Louisville Railway, of the winning of the Brady Award in 1926.

"There has never been a month since the winning of the award," said Mr. Barnes, "that has not seen more trainmen with accident-free records." The people of Louisville, he said, were quick to grasp the fact that their company had accomplished a noteworthy achievement, and the response had been a decided stimulus to community safety.

L. S. Storrs, managing director of the American Electric Railway Association, spoke briefly on the interest of the electric railways in the safety movement, explaining that accidents were now costing approximately 4 per cent of the gross receipts, and would be even more expensive but for the accident-prevention work which the properties were carrying on along systematic and methodical lines. "I am opposed," said the speaker, "to safety drives and campaigns of a week or a month. Every day must be safety day in our business." The ideal man for safety work, he explained, is not an enthusiast, but a man with a keen, analytical mind, a proper sense of values and, above all, a thorough understanding of human nature.

Col. A. B. Barber, manager of the transportation and communication department, Chamber of Commerce of the United States, spoke on "The Nation-wide Movement for Better Street and Highway Traffic." He told of the far-reaching effects of the measures taken by electric railways along the lines of accident prevention and the building up of good will among their employees. He said:

> If the electric railway systems in the country could be brought to realize the opportunity which the safety movement offers for their future welfare they would not delay in entering the contest for the Brady Awards. Furthermore, if local civic organizations appreciated what participation in this contest can effect in securing better street transportation service for their citizens, I believe they would be among the first to insist that the systems which serve them be entered in the contest.

The speaker explained the organization of the Hoover Conference on Street and Highway Safety, which has resulted in the adoption of uniform vehicle code and standard traffic ordinance, the standardization of traffic signs and of pavement markings. In telling of the excellent results that had followed the abolition of automobile parking in the Loop district of Chicago he paid high tribute to the work of officials of the Chicago railways, which had made these results possible. The colonel classified the present traffic regulations in New York as obsolete and cast doubt upon the assumption that the

local situation was in any way unusual. Pennsylvania, he stated, had the best traffic laws. According to conservative estimates traffic delays are costing the country $2,000,000,000 a year.

Lewis Gawtry, chairman Brady Award committee of the American Museum of Safety, then presented the Brady medals. The gold medal, for companies operating over 5,000,000 car-miles during the year, was accepted on behalf of the Penn-Ohio System, Youngstown, Ohio, by C. S. MacCalla, vice-president of the property. Present also, representing the winning company, were R. P. Stevens, T. A. Kenney, W. H. Sawyer and R. N. Graham. Mr. MacCalla gave credit for the company's excellent showing to the close co-operation of its employees.

In 1928 the Penn-Ohio System won the Coffin Award and also annexed an award offered by *Forbes Magazine*, for notable progress made in the field of establishing better public relations. The Penn-Ohio System is the only property to have the distinction of receiving all three of these awards.

The silver medal, for properties operating between 1,000,000 and 5,000,000 car-miles in 1927, was accepted for the Tampa Electric Company by C. S. Edwards, head of traffic. Mr. Wendell accepted the bronze medal on behalf of the Tide Water Power Company, Wilmington, N. C., which won the award during the previous year. Certificates of honorable mention were awarded the Louisville Railway, which won the gold medal in 1926, and to the El Paso Electric Company, which won the silver award that year.

The awards will be made next year.

The Brooklyn City Railroad Band made a surprise appearance, coming direct from its engagement on the Keith Circuit. Employees of the Brooklyn City Railroad also put on a splendid minstrel show.

Boston's Mayor Sees Inadequate Transit Facilities

Mayor Malcolm E. Nichols, in his fourth annual address to the City Council, drew attention to the inadequacy of the rapid transit facilities of metropolitan Boston as being "far from what they should be." He claimed that the run-down condition of the Boston Elevated when it was taken under public control in 1918 was a matter of common knowledge.

His address in part follows:

During the past ten years the physical properties of the Elevated have been rehabilitated. In the ten years ending Dec. 31, 1927, $22,115,563 had been expended from the depreciation account by the public trustees and included in the cost of service to the car-rider, as against $1,006,249 similarly applied in the preceding ten years. I believe that necessary rapid transit extensions should be provided with comparatively slight, if any, burden on the taxpayer.

I shall urge upon the Legislature this year the construction of the Huntington Avenue Subway, the extension to Day Square in East Boston, the extension of the Boylston Street Subway to Harvard Avenue, with the necessary extension on Beacon Street at Governor Square, and the extension of the Elevated from Forest Hills out Hyde Park Avenue to a station near Mt. Hope to care for the residents of Hyde Park, and thence across the main line of the New Haven Railroad and Washington Street to the West Roxbury Branch, and thence along the West Roxbury Branch through Roslindale and West Roxbury.

P.R.T. Offers Aid in Traffic Problem

DURING this last year it has become increasingly apparent in Philadelphia that the factor of street-traffic congestion is having a strangling effect upon business and industrial prosperity. Traffic in the central business area and in various important outlying business centers has seemingly reached—and passed—the saturation point. Not only the public transportation mediums but almost all other phases of the city's economic life are vitally affected by the resulting congestion.

All authorities agree that sweeping steps should be taken to correct this condition before Philadelphia can hold its present industrial leadership and hope for future expansion. Accordingly, Mitten Management, operator of the Philadelphia Rapid Transit Company, has volunteered the services of its engineers and traffic experts toward the working out of a solution for this problem. Already comprehensive steps have been taken in making a city-wide survey of traffic conditions, with a view to preparing a plan for the city which will make possible immediate relief from congestion.

The features of co-ordinated transportation in this community have been and will continue to be applied toward the elimination of congestion caused by the public transportation services; 1929 will be a year of increased activity for every member of the P.R.T. organization.

R. T. SENTER,
President Philadelphia Rapid Transit Company, in the Philadelphia *Ledger*.

Jeweled Badges for Chicago Employees

Nearly 1,000 veteran employees of the "L" lines were presented recently with jeweled service badges by Britton I. Budd, president of the Chicago Rapid Transit Company, Chicago, Ill. A total of 923 men and 75 women employees, who have worked on the "L" for twenty years and upwards, were awarded the jeweled emblems, accompanied by a personal letter of congratulation from Mr. Budd. The wives of the veteran employees received annual passes on the lines for their personal use.

A survey of employment records on the "L" showed that 35 employees had been with the railroads for 35 years; 145 more than 30 years; 317 more than 25 years and 501 more than 20 years. The years of service are denoted by the jewels in the gold badges, 20-year badges having one ruby; 25 years, two rubies; 30 years, three rubies and 35 years, one diamond. About 17 per cent of the entire working forces on the "L" lines are represented in the veterans' legion.

Electric Railway Status Before Commission

The bill, introduced by Representative Johnson of Indiana, designed to clarify the status of electric railways in relation to the Interstate Commerce Act, which was opposed by the Interstate Commerce Commission last session, has been brought forth again with modifications. This revised measure is now being considered by the commission, which must approve the matter before it can be taken up by the House Committee on Interstate Commerce.

Mr. Johnson's bill proposes to place a type of electric railway, to be designated as a commercial electric railway, on a parity with steam lines as far as the Interstate Commerce Act is concerned. The commission last year expressed a willingness to grant this parity of rating, but disapproved the method of classifying commercial electric railways.

Supporters of the bill state that, in general, the measure has been modified so as to meet many of the objections raised by the commission. It is pointed out also that particular attention has been directed toward retaining control of electric railways in the hands of local agencies, so far as this can be done. Although it is not believed that the commission will be able to report on the measure in time to have it receive attention by Congress this session, it is thought that the effect will be to emphasize the necessity of clarifying the electric railway phase of the Interstate Commerce Act.

Children Favored in Westchester

An amendment, approved by the commission, to the tariff of the Westchester Street Transportation Company, Inc., controlled by the Third Avenue Railway System, New York, N. Y., establishes a new regulation to the effect that school children in regular attendance at schools served by its lines, on which the fare for a single ride or in a single zone is not less than 10 cents, will be permitted to ride between the hours necessary for attendance at schools, for a 5-cent fare in any single zone. A certificate from the principal of the school stating that the pupil is a regular attendant, must be presented at the time of fare payment.

Subway Film Shown in Philadelphia

A motion-picture film made by the Department of City Transit, Philadelphia, Pa., depicting the construction of the Broad Street subway, was shown for members of the Special Libraries Council at a meeting in the offices of the department in City Hall Annex on Jan. 4. Details of the work were explained by Norman M. Rolston, the department's photographer, as the film progressed.

Colonel Alexander on the Passing of the Straphanger

"Elegance came to Cleveland's streets with the inauguration of the new duplex car train service, the last word in metropolitan street transportation. The forerunner of similar de luxe service that will one day soon serve all the city, the new cars are the finest combination of comfort, convenience, speed and safety yet devised. Luxurious appointments combine with the most modern heating, lighting and operating devices to make these new trains the ultimate in travel accommodations. The day of the straphanger is passing, for these cars have the ample accommodations of a transcontinental limited, they start with the easy acceleration of an automobile and stop without a stutter on a dime."

So says Joseph H. Alexander, president of the Cleveland Railway, Cleveland, Ohio, writing in the Cleveland Trust Company monthly for November. As Mr. Alexander sees it, there is no more important factor in this day of rapid metropolitan transportation than accessibility and today it is measured in terms of minutes rather than of miles. He says to the public of Cleveland that no matter where its destination may be, there is a street car that will take you there. As near as the nearest car stop, as free from traffic worries as your fireside, the chief points of civic and industrial interest of Cleveland are at your command. Parks, theaters, churches, schools stores, even the great out-of-doors is reach easily, quickly, conveniently and cheaply by street car. Mr. Alexander continues:

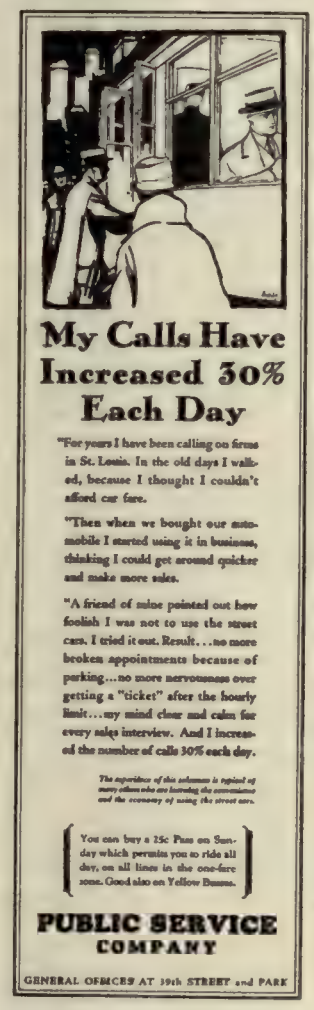
It's a far cry from the days when the late John L. Stanley drove a horse-car and it seems almost as far from the days of the Municipal Traction Company and the 3-cent fare of the late Tom L. Johnson, but the basis of the service of the Cleveland Railway was founded in those days of stress and the constant effort to keep just a little ahead of the rest of the country, in the type of service offered to Cleveland, has reached from those early days to the present.

When the business of the Cleveland Railway is good, the car rider, not the stockholder, benefits. At present 6,200 people own the stock of the company and through the Tayler grant they are paid only the 6 per cent return upon their investment and no more. All expenditures are authorized by the Cleveland City Council. The service is fixed by City Council and the fare is determined by the cost of that servcie. No other large city in the United States has had a car fare so low as Cleveland and no city a service equal to that offered by the Cleveland Railway.

Six thousand people are employed by the Cleveland Railway and their salaries amount to more than $10,000,000 a year. That may give some idea of the scope of the work that goes on behind the motorman and the conductor.

One of a Series in St. Louis

The St. Louis Public Service Company, St. Louis, Mo., is using considerable newspaper advertising space to popularize the use of street cars and



to combat the inroads of automobiles on street car revenue. Part of the copy is from the personal experience of street car users.

A typical ad was from a salesman who increased his calls 30 per cent a day by using the street cars instead of his own automobile. He met with no delay over parking space and suffered no worry over possibility of getting a summons while making a sale.

The no-parking rule for the downtown section of St. Louis, Mo., which proved effective in the Christmas shopping period, has been continued in force by Chief of Police Gerk. Enforcement of this rule is simply a matter of courtesy on the part of autoists as there is no city ordinance covering it. However, the police experienced little difficulty in keeping the streets clear of automobiles.

City and Interurban Co-ordination at Milwaukee

Progress is reported in the work of co-ordinating the city and interurban lines of the former Milwaukee Northern Railway with the rest of the system of the Milwaukee Electric Railway & Light Company. The most modern one-man safety cars of the Milwaukee Electric are being operated, greater frequency of service has been established, universal transfer privileges extended, and other improvements made.

At the same time, designated city stops have been made effective on the Northern Division interurban line, in accord with the practice on the rest of the rapid transit system of the Milwaukee Electric. These improvements were made possible by the merger of the Milwaukee Northern Railway with the Milwaukee Electric several months ago.

Rapid transit service between Milwaukee, Racine and Kenosha has been improved further by extension of local city service from Racine north to the Four Mile road. Interurban cars now make only certain designated stops in the city of Racine while the new local service takes care of the city and suburban passengers formerly carried on the interurbans.

New freight connections have been constructed and car inter-change arranged for between the East Troy-Burlington Rapid Transit line and the Chicago & Northwestern and the Chicago, Milwaukee, St. Paul & Pacific Railroad systems. Through freight tariffs have been filed and as a result shippers are able to save the additional switching charge formerly collected by the steam roads.

Stations benefitting most from the new plan are East Troy, Big Bend, Muskego and Rochester. Mukwonago and Burlington are already served directly by steam railroads, but will also be able to ship via Milwaukee Electric and Northwestern or Milwaukee steam roads.

Older Employees May Be Saved in Seattle

The preference prescribed for former service men under a city charter amendment, voted by the people as a post-war measure, must be observed in trimming down the operating force of the Seattle Municipal Street Railway System, Seattle, Wash. This decision was reached by the Civil Service Commission after two conferences between representatives of the street car men's union and George B. Avery, superintendent of city utilities, had failed to settle the question satisfactorily. Approximately 110 street car motormen and conductors are to be dropped from the payroll when Mr. Avery replaces shortly most of the city's two-man street cars with one-man equipment as part of his retrenchment program. Union officials have maintained that seniority rules and personal efficiency should decide which men are to keep their jobs.

Ohio Property Sold

The Southern Ohio Public Service Company, which operates between Columbus and Zanesville, Ohio, has been sold to the American Gas & Electric Company, of New York. The purchase includes all property and holdings of the company. It was understood the deal involved several millions of dollars. It is part of the $17,000,000 expansion program announced by the American Gas & Electric Company.

Permission was recently granted by the Ohio State Utilities Commission to the Southern Ohio Public Service Company to discontinue the Columbus-Zanesville line on Jan. 15. Officials of the New York concern said they would abide by the decision of the commission. Southern Ohio Public Service Company will continue to operate under the same name with E. J. Wagenhals, Newark, Ohio, as general supervisor.

Ordinance Perfection Going Forward in Chicago

Several provisions in the proposed ordinance for the unification of Chicago elevated and surface lines are being questioned as to their constitutionality by attorneys for the companies. In the opinion of the attorney for the Chicago Railways several sections of the city's ordinance draft, upon which negotiations have been proceeding since last October, will not stand test. He referred specifically to the provision requiring the city to pay the discount on all new capital to be invested in the consolidated system. Further study is being given to the validity of the section authorizing the city to buy the bonds of the new company. As an alternative it was suggested that the negotiating committee consider the ordinance prepared several years ago by Francis X. Busch, former corporation counsel, which did not necessitate enabling legislation. The attorney also urged the committee to ask the General Assembly for the required legislation before deciding upon the terms of the ordinance.

A similar recommenation was made several weeks ago by A. W. Harris, chairman of the Chicago Railways' bondholders protective committee. It is reported that the new Citizens Traction Settlement Committee, appointed by Federal Judge Wilkerson, also believes that enabling legislation should precede the passage of a franchise ordinance. Six bills conferring the power to make the new ordinance effective were prepared recently by the Corporation Counsel for submission to the legislature, but were not considered by the local transit committee.

Leonard A. Busby, president of the Chicago City Railway, contended that the discount on new money could be absorbed by amortization and as for the city buying the bonds of the company, it could use the money to buy other bonds and get just as good a return on the investment.

Mr. Busby added that before going to the Legislature and asking for new powers, an agreement on fundamentals in the proposed ordinance was necessary.

The session during the week ended in the Aldermen's deciding to continue the work of perfecting the present ordinance before seeking enabling legislation.

Action Deferred in Erie County

Following a public hearing, the Erie County Board of Supervisors, Buffalo, has deferred action on the proposed purchase of the franchise of the Erie County Traction Company operating an interurban line between Buffalo and Hamburg for $125,000. It is proposed to use the right-of-way to widen state highways which parallel the traction line. County Engineer George C. Diehl estimated it would cost between $1,500,000 and $2,000,000 to acquire rights-of-way if the route of the railway line is not purchased by the county and an additional $500,000 would be required to eliminate grade crossings.

Richard S. Persons, president of the Erie County Traction Company, said that upwards of $750,000 has been invested in the property and the amount asked for the right-of-way would only pay taxes and retire the first mortagage bonds. The railway company would scrap the line and substitute buses. People along the line are protesting the substitution of buses.

In this connection State legislation of a permissive but not mandatory nature will be sought by the Erie Supervisors to insure the legality of the proposed purchase of the railway between the Buffalo city line and town south.

The plan to purchase the property and widen the highway is approved by the trustees of towns affected. The Board of Supervisors believes it lacks sufficient power to negotiate the purchase without state legislation.

The Governor's Appointments

SEVERAL of the big appointments now made by Governor Fuller of Massachusetts are of importance chiefly to the Metropolitan district. The Boston newspapers accept as satisfactory the three men named as state trustees of the Boston Elevated Railway. Winthrop Coffin, who voluntarily retired, could not be replaced, in view of his long experience and special knowledge of public utilities, yet Messrs. Harriman and Johnson possess real qualifications for these positions. Gen. Charles H. Cole, the third appointee as trustee, should prove to be a capable representative on the board of a large section of the population served by the Elevated system. The competent Col. Charles R. Gow succeeds Mr. Harriman as chairman of the Metropolitan planning division and his prestige as an engineer is beyond question. — *Springfield Republican.*

United Corporation Organized

Bankers join to acquire certain minority interests in U.G.I., Public Service of New Jersey and Mohawk-Hudson

THE United Corporation has been organized under Delaware laws by J. P. Morgan & Company, Drexel & Company and Bonbright & Company, Inc., to acquire certain minority interests in the United Gas Improvement Company, the Public Service Corporation of New Jersey and the Mohawk-Hudson Power Corporation held by the organizers and the American Superpower Corporation. The capitalization of the corporation is as follows:

	Authorized, Shares	To Be Presently Issued, Shares
First preferred stock	1,000,000 (no par value)	None
Preference stock	2,000,000	944,187
Common stock	*10,000,000	3,810,853

*Four million shares will be reserved against exercise of option warrants.

There will also be presently issued option warrants entitling holders to purchase at any time without limit not in excess of 4,000,000 shares of common stock at $27.50 per share.

The preference stock presently to be issued will be known as three-dollar cumulative preference stock, will be entitled to cumulative dividends at the rate of $3 per annum, payable quarterly; will be redeemable at the corporation's option at $55 per share, and will be entitled on liquidation to $50 per share and accrued dividends.

There have been purchased by the organizers, for $20,000,000 cash, 800,000 shares of the common stock and option warrants for 2,000,000 shares of common stock. The balance to be presently issued of the common stock and option warrants and the 944,187 shares of three-dollar cumulative preference stock are to be issued in exchange for securities. The prices at which securities have been acquired by the corporation from the organizers are in excess of the cost to them, but below the present market.

The corporation's present assets will consist of the securities described, which have an aggregate value in excess of $130,000,000, and cash in excess of $20,000,000. The balance of the authorized capital may, in the discretion of the directors of the corporation, be issued for cash or property without offering to the stockholders. The directors of the corporation will be Thomas S. Gates, Alfred L. Loomis, Landon K. Thorne and George Whitney.

American Superpower Corporation Announcement

The American Superpower Corporation announced that at a meeting of its board of directors held on Jan. 12 the board unanimously voted to accept the offer of the United Corporation to exchange its holdings of Public Service Corporation of New Jersey and the United Gas Improvement Company for securities of the United Corporation.

C.E.R.A. Committees Complete Plans

Rooms have been reserved by the hotel and arrangement committee of the Central Electric Railway Association for the annual meeting to be held at the Claypool Hotel, Indianapolis, Ind., Jan. 24-25, 1929, as follows: 100 rooms at $3.50; 75 rooms at $4; 25 rooms at $4.50; 10 suites at $10 (parlor, bedroom and bath).

These prices are for one in a room; $1.50 additional for two. Members are asked to make reservations with the hotel direct as early as possible.

Provision has also been made by the committee for the annual dinner on the evening of Jan. 24, at which time some unusual entertainment will be offered, and ample arrangements have been made for the entertainment of ladies attending the convention.

The program committee has practically completed its work and printed programs will be mailed out soon. The subjects selected are of vital interest to members of the association, and the committee has endeavored to secure some of the best available talent to address the meeting. Each member of the association is urged to attend and to take part in the discussions.

Federal Trade Postponment in Electric Bond & Share Case

Federal Judge Thomas D. Thatcher recently postponed for one month argument on the motion of the Federal Trade Commission to compel certain officers of the Electric Bond & Share Company to appear before the commission with ledgers and vouchers. Subpoenas for the officers were issued in October. They contended the Electric Bond & Share Company was not engaged in interstate business and not subject to investigation by the commission.

Judge Thatcher found himself disqualified from sitting in the case because he had represented the company as counsel before seeking the bench.

Railway Man of Alliance Honored

Everett W. Sweezey, general manager of the Stark Electric Railroad, Alliance, Ohio, and head of a large Ohio utilities combine, was named a director of the Alliance First National Bank at the annual meeting on Jan. 8. He will fill a vacancy on the board of directors.

One-Man Car Legislation in Pennsylvania

Legislation aimed at the operation of one-man cars has been prepared by two Allegheny County members for introduction into the Pennsylvania Legislature, now in session at Harrisburg. The bills will be sponsored by Representative George F. Howe and Representative Frank E. Hoofman.

Mr. Howe's bill would require a crew of more than one on cars operating over grades of more than 2 per cent. The other measure would require a crew of at least two persons on all cars with a seating capacity of 40 or more passengers.

Different Rates Sought in Holyoke

The Holyoke Street Railway, Holyoke, Mass., has petitioned the Public Utilities Commission for permission to revise its rates, so as to sell three tickets for 25 cents in place of four tickets for 30 cents as at present. Request also is made for permission to sell school children's tickets at the rate of 42 cents for ten instead of 38 cents for ten.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 14-18*—American Road Builders' Association, convention and road show, Cleveland, Ohio.**

***Jan. 15-16*—Kentucky Association of Public Utilities, annual meeting, Brown Hotel, Louisville, Ky.**

***Jan. 16-17*—Central Electric Traffic Association, La Salle Hotel, South Bend, Ind.**

***Jan. 22*—New York Electric Railway Association, mid-winter meeting and dinner, Hotel Commodore, New York, N. Y.**

***Jan. 23-25*—Electric Railway Association of Equipment Men, Southern Properties, and Southwestern Public Service Association, Mechanical Division, joint meeting, Houston, Tex.**

***Jan. 24-25*—Central Electric Railway Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, New Public Auditorium, Atlantic City, N. J.**

"4 C's" to Bring Success in Boston

Contact, Conference, Confidence and Co-operation are the four C's of a successful new year, the goal of the Boston Elevated Railway, Boston, Mass. They are words advanced by E. K. Hall, vice-president of the American Telephone and Telegraph Company, as the "4 C's" of good employer-employee relations in an address before the National Industrial Conference Board on Nov. 15, 1928. The Boston Elevated employees are asked to make the theory work in a practical way.

What Happens to Tokens in Rochester

With the advent of a 10-cent cash fare on railway and bus lines of the New York State Railways in Rochester on Jan. 1, the metal "takens" used for convenience in making change during the 9-cent fare's reign, are no more. The tokens will be held in reserve during the life of the present service-at-cost contract under which the railways operate their lines, as a reduction in fare is possible. Despite the 1-cent cash fare boost, the tickets can still be purchased at the old rate, 8⅓ cents each or twelve for $1. The change, railway officials expect, will result in an increased use of tickets. Under the 9-cent fare, it was estimated that about 60 per cent of riders used tickets. Thus the casual rider will bear the brunt of the fare increase.

The fare was raised to enable the railway to recoup the balancing fund of $300,000 created when the service-at-cost contract went into effect in 1920.

New Fare Agreement in Bloomington and Decatur

Demand of modification of the street car and bus fares in Bloomington and Decatur, Ill., has resulted in the Illinois Power & Light Corporation agreeing to establish a schedule of seven street car or bus fare tokens for 50 cents and fifteen for $1, effective Feb. 1. The company is retaining the present authorized fare of 10 cents with three tokens for 25 cents.

Wage Increase in York

An increase in pay for both motormen and conductors was a New Year's gift to employees on the York Railways, York, Pa. Under the new scale trainmen on two-men cars will receive an increase from 48 to 55 cents an hour and operators of one-man cars an increase of from 53 to 60 cents an hour. This increase was in recognition for "loyal and efficient" service. The company for the first eleven months of 1928 reported a decrease of approximately $60,000 in revenue.

Recent Bus Developments

Buses May Succeed Manhattan Bridge 3-Cent Line

Transit Commissioner Charles C. Lockwood recently announced that he would recommend to the full commission that the Manhattan Bridge 3-Cent Line is "an undue obstruction to traffic" on the bridge. His action is in rapport with a resolution adopted by the Board of Estimate last October on the recommendation of Controller C. W. Berry, who urged the immediate purchase of the right-of-way at the price of $184,000. Later $206,760 was named as the price to be paid.

The railway franchise expires in 1937. It covers a surface route running from the Bowery at Canal Street to Flatbush Avenue, Brooklyn. Edward A. Byrne, chief engineer of the Department of Plant and Structures, stated that a temporary bus route would be established as soon as the tracks have been removed.

The Equitable Coach Company, in the amended franchise petition now pending in the Board of Estimate, seeks to operate a bus line across the bridge between the terminal points now connected by the 3-cent surface car route.

The surface car line's equipment includes sixteen cars, automobiles, poles, wire, paving and other supplies. The company's figure of $184,000 included $57,600 as payment for the equipment and $126,000 as the value of the unexpired portion of the franchise.

This purchase by the city was referred to in the ELECTRIC RAILWAY JOURNAL issue of Nov. 3, 1928.

Higher Fares on Rochester Lines

The Public Service Commission has approved a new schedule for the Rochester Railways Co-ordinated Bus Lines, Inc., under which the cash fare on its several lines in the city of Rochester, N. Y., is increased from 9 to 10 cents. Fares to or from points outside the limits of the city of Rochester are similarly increased. There is no change in transfer arrangements, except that on the Grand View Bus Line and Island Cottage Bus Line transfers issued by the New York State Railways will be accepted without additional payment.

Bus Likely to Supplant Whitestone Branch

The Long Island Railroad through George Le Boutillier, vice-president, has applied to the Interstate Commerce Commission for permission to abandon the Whitestone Branch, an electric division. In its application the company claims that three factors have forced the road to this conclusion. They are the continuous falling off of business for a number of years, resulting in an operating deficit of upwards of $10,000 a month, grade crossing eliminations required by the Transit Commission which would cost at least $4,000,000 and the fact that inevitably the city's own rapid transit lines must serve the territory traversed by the Whitestone Branch.

In addition to these considerations, the bus situation, which has been more or less in suspense for a considerable time, is rapidly straightening out and a comprehensive system of buses in the territory will be completed in the near future.

Change in Vehicle Requirements Proposed in Boston

Henry I. Harriman, for the Boston Elevated Railway trustees, has had filed at the State House a bill permitting the use of buses 31 ft. 6 in. long, instead of 29 ft. as the present law requires, on routes of the Boston Elevated and bus routes in the state authorized by the department of public utilities. At the present time, to conform to the Massachusetts law, buses have to be especially built, since the state's regulations differ from the other states.

Extensive Rerouting in Toledo

Toledo's most ambitious rerouting of its public transportation system in many years became effective on Jan. 1 when the new Franklin-Fulton bus line was put into service, a new Lincoln Avenue line created, and the Ottawa Park and Ottawa Hills line, serving the same territory partially, began operations in conformity with the railway-bus plan of the Community Traction Company, amending the Milner ordinance operation.

Announcement of the new bus routing was simplified by Commissioner E. L. Graumlich by issuing them to newspapers and in pamphlets in the form of a small map in black and white.

Bus revenue of the Community Traction Company, is now nearly three times as great as it was a year ago.

The Bancroft Belt line, one of the oldest railway lines in Toledo, was abandoned on Dec. 31, 1928. Thomas Shirley, a motorman on the railway lines in Toledo for 35 years, was assigned to take the last car around the loop. He had broken in on the line about four years after it started. On the car that night were passengers whose parents Shirley had carried to school on the cars of the old line.

The Bancroft Belt was one of the lines laid out in 1889 by the Toledo Electric Street Railway. Two of its sister lines have been abandoned in recent years. It was one of the so-called Robison lines. Loss of this line will be compensated by a new bus line.

New Certificate Sought by Pacific Electric

The Pacific Electric Railway has applied to the Railroad Commission for a certificate of public convenience and necessity to operate an auto stage service between Wingfoot (Pacific Electric Station) in Los Angeles and the Ford plant in Long Beach and intermediate points.

Seattle-Tacoma Now Has Reduced Rates

After providing transit facilities between Seattle and Tacoma for the past 26 years, the Seattle-Tacoma interurban line of the Puget Sound Electric Company ceased operations on Dec. 30. At 11:30 o'clock, single-car trains left the Seattle Station and the Tacoma Station on the last runs over the line. They were manned by four men who have been with the line since its establishment in 1902. When these cars reached their terminals one hour and ten minutes later, the road passed into history. The competition of auto stage lines and private automobiles has caused a falling off in passenger traffic so great that abandonment became necessary. Rolling stock and equipment will be sold or transferred to other holdings of the company and shops and trackage removed.

The North Coast Transportation Company, a Stone & Webster subsidiary, which operates automobile stages between the two cities, announced a reduction of stage fares, effective on Jan. 3, following more frequent service and faster running time. Fares for the one-way and for the round trip are reduced. Reductions also are made in fares from Seattle to Olympia, Aberdeen, Chehalis, Centralia and several other points.

Highway Costs Should Also Be Met by Bus Companies

James F. Hamilton, president of the New York State Railways, believes that bus and trucking companies should pay their share of highway upkeep costs. Asked for his opinion after Charles Barham, vice-president of the Nashville, Chattanooga & St. Louis Railroad, had declared at a Chamber of Commerce meeting in Rochester that motorized carriers should be taxed for road repairs and construction, President Hamilton said:

> The companies should be taxed in proportion to the amount of wear and tear they give the roads. Not only do they offer unfair competition to the railroad and trolley lines by being able to use highways free while the latter have to pay large amounts for the upkeep of their paving, but the trucks and buses are to a large measure accountable for wearing out roads.

The company of which Mr. Hamilton is president, besides operating the electric surface and subway lines in Rochester, has a fleet of more than 100 city and interurban buses in operation at the present time.

Financial *and* Corporate

Maturities of Eastern Massachusetts Met

The Eastern Massachusetts Street Railway, Boston, Mass., paid off on Jan. 2 maturing bonds totalling $628,700 consisting of the following issues:

$55,500 Mystic Valley 6s; $220,000 New Bedford, Middleboro & Brockton 5s; $46,000 Boston, Milton & Brockton 6s; $224,000 Eastern Massachusetts S-A 6s and $79,200 Eastern Massachusetts S-C 6s.

In addition, the road had in its own treasury bonds of these various issues aggregating $258,300 which have also been retired.

On Feb. 1, there is a further maturity of $293,000 South Shore & Boston 6s which will undoubtedly be paid off from treasury resources, as were the bonds coming due Jan. 2.

Western Line to Be Taken Over by Steam Road

W. E. Brown president of the Cowlitz, Chehalis and Cascade Railway and Chicago, Milwaukee & Pacific Railroad, has announced a proposition to take over the interurban electric line operating for the last twenty years between Chehalis and Centralia, Washington. The tentative plan is contingent on permission being granted by the city of Chehalis to extend the trackage.

Other plans include an extension of the electric line east of the Southwest Washington fair grounds directly to the big sawmill plant of the Eastern Railway & Lumber Company in Centralia.

It is reported that about $500,000 will be spent and it is also proposed that the entire trackage will be rebuilt and rehabilitated with heavy steel used.

The purpose of this enterprise is mainly to insure permanency at Chehalis of the big sawmill plant of the Coal Creek Lumber Company, owned by C. L. Brown, and to insure future log supply of the Eastern company at Centralia.

Georgia Employees Again Sell Stock

Through its employees the Georgia Power Company, Atlanta, Ga., is offering $5 preferred stock at $90 per share, plus accrued dividends, on terms and conditions similar to those under which the company employees so successfully sold the company's $6 preferred stock. Employees are to be paid a commission of $1 a share on all stock sold. The stock pays dividends quarterly, is offered to residents of Georgia only and is being sold both for cash and on the time-payment plan, the latter calling for down payment of $10 per share and payment of $10 per share per month until the stock is paid for. As an inducement to employees to purchase the stock themselves special terms have been arranged of $5 per share down and $5 per share per month until the stock is paid.

$492,514 Net in Baltimore

For the first eleven months of 1928 there was an increase in passenger revenue of the United Railways & Electric Company, Baltimore, Md., of $72,423. For the eleven months operating expenses increased $186,590, and net earnings decreased $97,994. The company says that this decrease will be more than offset by the adjustments that were made at the end of last year through allowance by the Maryland Public Service Commission for increased costs of power and accidents.

November showed an increase in gross revenue slightly less than the increase noted for October. The passenger earnings for November were $1,344,326 compared with $1,317,692 for November, 1927, an increase of $26,634. Net income increased $1,881.

The effect of the new fare rate of four tokens for 35 cents or 10 cents straight will not be known until the December operating report is compiled, as the rate did not become effective until Dec. 1.

The statement of the company for the eleven months ended Nov. 30 is as follows:

	1928	Increase
Passenger revenue	$14,646,254	$72,423
Other revenue	196,512	x19,406
Totals	$14,842,766	$53,016
Operating expenses—		
Way and structures	$804,498	$31,810
Equipment	845,145	13,891
Power	1,299,692	37,816
Conducting transportation	4,731,114	16,402
Traffic	20,804	9,273
General and miscellaneous	1,468,980	69,127
Transportation for inc.—Cr.	*6,912	8,268
Totals	$9,163,323	$186,590
Depreciation	742,158	2,650
Totals	$9,905,462	$189,241
Net operating revenue	$4,937,304	x$136,225
Taxes	1,449,625	x15,859
Operating income	$3,487,679	x$120,365
Non-operating income	134,237	x12,469
Gross income	$3,621,916	x$132,835
Fixed charges	2,616,068	x34,840
Remainder	$1,005,847	x$97,994
Interest on income bonds	513,333	.....
Net income	$492,514	x$97,994

The net income by months was as follows:

	1928	Increase
January	$18,366	x$53,761
February	18,769	x8,820
March	63,255	x18,254
April	37,535	x23,465
May	61,738	x1,491
June	30,009	x11,711
July	34,506	x1,863
August	20,453	x395
September	39,034	342
October	92,584	19,845
November	76,260	1,881
	$492,514	x$97,994

*Credit. xDecrease.

P.R.T. Underliers Petition to Be Heard

Judge Finletter, in Common Pleas Court, recently fixed Jan. 19, to hear the petition asking for a court ruling on whether the $138,376,907 which the city proposes to pay for the purchase of the underlying companies of the Philadelphia Rapid Transit may be deducted from the city's indebtedness in ascertaining its borrowing capacity. To date Controller Hadley has failed to join in the court action. The city intends to issue bonds in the amount needed to acquire the franchise of the underliers.

The company now pays $8,822,845 annually to the subsidiaries as rentals, but Mr. Hadley holds the view that there is no guarantee to the city that the transit company will continue to pay rentals sufficient to meet the sinking-fund and interest charges on the proposed bond issue.

Further Steps in Washington Merger

By action taken at a meeting of the Senate District committee on Jan. 9, Congress has eliminated any fixed valuation amount from its consideration of the bill proposing a merger of the Washington street railways. A resolution was adopted directing the District Utilities Commission to evaluate the properties within two years, during which time it was agreed that the rate of fare should remain unchanged. The Senate committee also requested the Utilities Commission to allow Dr. Milo R. Maltbie, whose services have been engaged by the committee for the purpose of advising it on the merger situation, to direct the valuation.

It is believed in some quarters that the Senate's action in placing Dr. Maltbie in charge of the valuation study is intended as a rebuke to the Utilities Commission. It is pointed out that Dr. Maltbie reported to the Senate that the companies' $50,000,000 figure is excessive. The Senate in striking the valuation factor from the merger bill, however, did so without prejudice.

Dr. Maltbie was authorized also to represent the Senate Committee in conferences with street railway officials for the purpose of settling the disputed points.

California Short Line Acquired

Formal acquisition of the Sacramento Short Line by the Sacramento Northern Railway, subsidiary of the Western Pacific, has been effected. Operation of the Short Line will enable the Sacramento Northern to operate a through line of electric railroad between Oakland and Chico, via Sacramento.

H. M. Adams, president of the Western Pacific Railroad, has been elected president of the Sacramento Northern Railway to fill the vacancy created by the resignation of G. F. Detrick.

Personal Items

E. G. Buckland Heads New Haven Road

Edward G. Buckland was elected chairman of the board of directors of the New York, New Haven & Hartford Railroad, with the authority to exercise the powers and perform the duties of president until a president is elected. He fills the vacancy caused by the recent death of Edward J. Pearson.

Mr. Buckland has been connected with the New Haven system since 1898 when he became attorney for Rhode Island with office in Providence. In 1904 he was appointed attorney for Connecticut and New York and in 1907 was appointed vice-president. Later, his duties were extended to that of general counsel. At the time the government took over control of the railroads in 1918, Mr. Buckland became president of the corporate organization which position he held until 1920 when the road was returned to private control. He was then re-elected vice-president and general counsel. In 1924, under a revision of the company's organization, Mr. Buckland became vice-president in charge of law and finance and corporate relations.

Mr. Buckland was born in Buffalo in 1866. He holds degrees from Washburn College and from the Yale Law School. For the nine years ended 1898 he was an instructor and assistant professor of law at Yale.

Messrs. Fullen and Murray Appointed

William G. Fullen has succeeded John J. Gilchrist as chairman of the New York Transit Commission. He has been in contact with rapid transit affairs in New York for more than twenty years. As chief counsel he served the old Public Service Commission and later in a similar capacity with the New York City Board of Transportation he learned much about the transit problems affecting the metropolis. In 1907 he became a clerk in the office of the old Public Service Commission only later to become secretary to counsel and ultimately chief counsel, holding that office when the Board of Transportation was established in 1924. He then became chief counsel to that body, but resigned last August to enter private law practice.

John F. Murray has been appointed a member of the New York Port Authority by Governor Roosevelt, to succeed H. K. Twitchell, deceased. For several years the incumbent was vice-president and general manager of the Metropolitan Service Corporation, Brooklyn, and in 1923 he became the vice-president of Thomas E. Murray, Inc., consulting engineers of Brooklyn, a position he now holds along with others. Mr. Murray was born in Albany. He was educated in the Brooklyn Preparatory School and was graduated from the Stevens Institute of Technology.

James F. Hamilton Leading Figure in New York State Acquisition

James F. Hamilton, of Rochester, for ten years president of the New York State Railways, has been elected president of the Schenectady Railway, the United Traction Company of Albany and the Capitol District Transportation Company, all recently acquired by the E. L. Phillips interests of New York, owners of the New York State Railways. It is expected that the systems, serving eight cities and scores of rural communities, will be merged into one of the biggest combines in the state, with executive offices in Rochester and with



James F. Hamilton

Mr. Hamilton as president. The merger awaits approval by the Public Service Commission. It is believed that, following his usual policy, Mr. Phillips will form a holding corporation to govern all the companies embraced in the pending merger.

Mr. Hamilton began his railway career as a conductor in Buffalo when a boy. He succeeds Leonor F. Loree, president of the Delaware & Hudson Railroad, at the helm of the United Traction and the Capitol District Companies, and replaces James H Hustis as head of the Schenectady unit. Mr. Hamilton has had a Horatio Alger career. Born on a farm in Birdsall, Allegheny County, he was a conductor on the Buffalo surface lines for several years. In 1903 he became assistant superintendent of the Schenectady Railway and seven years later was promoted to superintendent. In 1911 he was made general superintendent of the United Traction Company in Albany and the next year became general manager of the Albany and Schenectady lines. He came to the New York State Railways as general manager in 1917 and the following year was named a vice-president. In 1918, a few months later, he was elevated to the presidency of the company, a position he has held without interruption since. He is a past president of the New York Electric Railway Association.

Under the combination, the electric railway, bus and trackless trolley lines of Rochester, Syracuse and Utica (New York State Railways) Albany, Rensselaer, Troy, Cohoes and Watervliet (United Traction Company) and Schenectady (Schenectady Railway) will be united. The Capitol District Transportation Company operates bus lines in the Albany territory. Many other interurban and bus lines serving western and central New York will be part of the gigantic system.

Schenectady Railway directors are James F. Hamilton, B. E. Tilton, of Syracuse; E. J. Crammey and H. P. Frost, of E. L. Phillips & Company, New York; E. G. Connette, United Gas & Electric Engineering Corporation; and Frank J. Stolz and A. S. Kleeman, of New York. Officers are James F. Hamilton, president; J. B. Mahon, secretary-treasurer; J. M. Joel, general auditor, and Roy R. Hadsell, general manager.

United Traction Company directors are James F. Hamilton and Howard L. Reichart, of New York State Railways; H. B. Weatherwax, of Albany, and E. J. Crummey, Frank J. Stolz, George W. Olmstead, Ernest Murphy and B. S. Granley of New York. Officers are president, James F. Hamilton; vice-presidents, Messrs. Stolz and Weatherwax; secretary, E. J. Crummey; treasurer, H. L. Reichart and comptroller, J. M. Joel.

Capitol District Transportation Company directors are Messrs. Hamilton, Stolz, Murphy, and Weatherwax. Officers are the same as those of the United Traction Company.

H. Lee Jones, former newspaperman and director of the Kansas Public Utility Information Bureau, has been appointed, effective Jan. 1, assistant to the vice-president of the Kansas Gas & Electric Company at Wichita to succeed the late Col. R. H. Timmons, who was drowned recently. For a number of years Mr. Jones was connected with the staff of the Topeka Capital. Six years ago he returned to Topeka as director of the information bureau formed by the Kansas public service companies.

E. I. Lewis has been elected chairman of the Interstate Commerce Commission to serve the year 1929. He succeeds Commissioner J. B. Campbell in the post, under the plan of rotation among the nine members. Mr. Lewis was chairman of the Indiana Public Service Commission when named to the Interstate Commission.

Fred I. King, who has been associated with the Indiana State Fire Marshal's office for the last three years, has been named secretary of the Indiana Public Service Commission.

Manchester's New Manager Is Versatile and Progressive

R. Stuart Pilcher, general manager of the Edinburgh Corporation Tramways, has been approved as the unanimous choice of the Manchester Tramways committee for general manager of the Manchester Corporation Tramways. Mr. Pilcher is an outstanding example of a craftsman who is internationally minded—an eclectic willing to adopt or adapt good ideas regardless of origin or local prejudice.

Mr. Pilcher's early training was obtained in Canada with the Montreal Tramways. From 1906 to 1918 he was general manager at Aberdeen, where he proved his ability to keep out of the grooveway. His experiments with zone-fare prepayment cars and his work with de luxe car seating at that time might have gone a long way toward earlier rejuvenation of the industry if the war and post-war conditions had not prevented this.

Mr. Pilcher went to Edinburgh in 1918, when the privately-owned cable railway came into the possession of the city. At that time the bus had come to be quite generally accepted for use in Great Britain. As a result there was great clamor from more or less interested forces to remove Edinburgh's rails altogether. After wide study Mr. Pilcher concluded that certain routes should undoubtedly be electrified, but that others could provisionally be operated with buses. Experience would furnish the basis for extending or stopping the electrification of additional routes. The result of this policy was the electrification of track on all the important routes. This decision did not prevent Mr. Pilcher from encouraging the use of the bus and turning that recently developed transportation vehicle to advantage in supplying sightseeing services.

In recent years he has made effective on a large scale the de luxe seating program advocated by him more than a decade ago. Car illumination also has been greatly improved, and every possible effort made to eliminate noisy cars. An example of his independent thinking in equipment matters is the comprehensive installation of air brakes in reversal of the use of the electric brake formerly general in Great Britain. Mr. Pilcher believed that the air brake was as desirable for shortening stops as greater capacity motors were for permitting faster starting.

Mr. Pilcher's success in securing acceptance of unusual ideas comes from the combination of a pleasing personality and thorough study of the facts. On one occasion, when members of the Edinburgh Council suggested that the American flat fare be adopted, it developed that the general manager was already completely conversant with the fare history of the United States and Canada. His statement on the subject left nothing effective to say in reply.

In employee relations Mr. Pilcher has also shown unusual traits. When he started an employee magazine he did not remain content to urge subordinates to work for the magazine, but set the example with his own contributions.

Qualities such as these will give the metropolis of Manchester a transportation executive ideally fitted to cope with its great problems be they underground railways or lines in the congested districts, or far-flung coach services in the greater Manchester area.

New Appointments on Ohio Interurban

Messrs. Stoughton and Donecker honored. Two experienced railway men take over new work in Conway organization

RUSSELL S. STOUGHTON and H. C. Donecker were recently elected assistant to the president and vice-president respectively of the Cincinnati, Hamilton & Dayton Railway, Cincinnati, Ohio, operating more than 300 miles of track.

Mr. Donecker was originally associated with Tom L. Johnson and his brother, Albert L. Johnson, in the construction and operation of the Nassau Electric Railroad, Brooklyn, N. Y. He acted as secretary and general assistant to Albert Johnson, who was president of the company which subsequently acquired the Atlantic Avenue Railroad, and was itself purchased by the Brooklyn Rapid Transit Company. Mr. Donecker then went to St. Louis and was secretary and assistant to the late Jilson J. Coleman, who had been general manager of the Nassau Company, and assisted in the work incident to the preliminary investigations, actual consolidation, and initial operation of the railroads there merging under the name of St. Louis Transit Company. He then returned to New York to enter the employ of Ford, Bacon & Davis, of New York, engaging while there in reporting work on railway properties. His next connection was with the American Electric Railway Association, where for a number of years he acted as secretary and treasurer, retiring in 1912 to become assistant general manager of the Public Service Railway of New Jersey, one of the largest properties in America. Mr. Donecker served in this capacity for about twelve years. Since that time he has been engaged in general reporting work on utilities and in other activities connected with railway and bus operations.

Russell S. Stoughton is a graduate of the Engineering School of the University of Pennsylvania. He has been associated with the Conway organization for the past eight years in connection with public utility investigations made during that time. He also had charge of the field work of a number of important investigations and studies in connection with operating and traffic problems made during the last few years by Thomas Conway and his associates.



H. C. Donecker



R. S. Stoughton

Personnel Changes in St. Louis

Dan Evans, assistant engineer of maintenance of way department of the St. Louis Public Service Corporation, St. Louis, Mo., was appointed insurance engineer attached to the treasury department, reporting directly to the executive vice-president, Stanley Clarke. Mr. Evans will have charge of all matters pertaining to insurance.

The chemical laboratory department was discontinued and M. M. Ridker, chemist, and his assistant J. J. Lewis have been transferred to the equipment department as engineers of tests reporting direct to O. C. Wright, general superintendent of equipment. Messrs. Edward Boehm and Henry W. Finklang of the chemical laboratory were transferred to the material and stores department, reporting to general storekeeper, D. J. Kelly. These changes were effective Jan. 1.

OBITUARY

SAMUEL WHITE, chairman of the Bristol, England, Tramways & Carriage Company, died on Nov. 29. He and his late brother Sir George White built up the tramway system of Bristol and introduced there some of the first electric cars to be used in England.

CHARLES GEORGE ROWLETTE, vice-president and treasurer of the Timken-Detroit Axle Company, Detroit, Mich., died on Dec. 24. Previous to this connection he worked in various capacities and locations for the American Sheet & Tin Plate Works. In 1916 he entered the Timken-Detroit Axle Company service as accounting manager. Two years later he was made assistant treasurer and in 1919 was elected treasurer. Later he became treasurer and assistant secretary, vice-president and treasurer and in 1926 a director.

Book Reviews

Handling London Underground Traffic

By J. P. Thomas, operating manager of London's Underground. Published by London's Underground, 55 Broadway, Westminster, London, S.W. 1. Cloth. 237 pages with index. Price 7s.6d.

This is a very interesting account of various aspects of the operation of the underground railways in London, primarily from a transportation point of view. Its preparation was begun originally for the benefit of the staff employed, to assist them to view their work as a whole from the outside. Then it was felt that a still wider audience might be interested. The result is the most extensive volume on the operation of any single electric railway or group of electric railways under one management which has ever been published. The nearest approaches are probably the volumes issued some 25 years ago by the Grosse Berliner Strassenbahn and by the Interborough Rapid Transit Company (the latter mostly on construction), and the 50-year Jubilee Book on "State Railways and Tramways in the Dutch East Indies," published in 1925, though the latter also contained much information on steam traction.

Mr. Thomas is to be congratulated on the thorough manner in which he has treated his subject. Thus, the table of contents shows that the topics treated in their order are: organization of the operating department, staff education and control, arranging and providing the service, problems of operation, control of the traffic, signalling and emergency devices, abnormal traffic movements, rolling stock, fare collection, design and operation of waiting stations and relations with employees, with two additional chapters of statistics. One of these relates to the movement of population in London, with the functions, advantages and disadvantages of other means of transit, like bus and tram. The other chapter gives passenger and financial records of the underground railways themselves.

Many articles relating to operating practices of the underground system in London have appeared in previous issues of the JOURNAL. From them readers of this paper are familiar with the main principles involved. Mr. Thomas' book, of course, describes these methods in much greater detail, as well as many others of great value. American managers, especially of rapid transit lines, can obtain a great many helpful ideas from a study of this book, particularly on the subject, now considered so important here, of making railway travel easy and comfortable, and thus attracting passengers.

The book contains a foreword by Frank Pick, managing director. He explains that while it may give the reader the impression of a fixed and settled state of affairs on the London Underground, this is far from the case. Improvement is never ended. The practice of the company is not static. It is and always must be subject to constant change.

Digest of Motor Court Decisions on Motor Carrier Operations

By John M. Meighan, secretary National Motor Bus Division, American Automobile Association, published by National Motor Bus Division of the American Automobile Association, Washington, D. C. 711 pages. Price, $10.

The general use of buses is so recent it is not surprising that the law respecting them is still in the making. There has been, of course, a great deal of legislation, but until a statute has been construed by the courts its practical effect is often uncertain. The American Automobile Association, through its Motor Bus Division, has therefore conferred a favor on the industry by compiling decisions of the courts, relating to this branch of the transportation industry. These decisions are not printed in full but are digested, so as to make the salient points as accessible as possible. They are grouped into fourteen divisions, or chapters, as follows:

Accident Liability; Certificates of Public Convenience and Necessity—Interstate Carriers; Certificate of Public Convenience and Necessity—Intrastate Carriers; Constitutionality of Regulations; Constitutionality of Taxation; Common and Contract Carriers—Determination of Status; Indemnity Bonds and Insurance; Injunctive Action Restraining Competition; Rates; Regulation as Exercised Under State and Local Police Powers; Scope of State Commission's Regulations; Taxes—Interstate Carriers; Taxes—Intrastate Carriers; Miscellaneous. Each chapter is further divided into decisions of the United States Supreme Court, United States district courts and state courts. An index is included in which there is a short syllabus of each case, giving the main points involved.

To keep the report up to date the publishers expect to issue monthly supplements of new decisions at an annual subscription price.

Propaganda—The Public Mind in the Making

By Edward L. Bernays. Horace Liveright, New York, N. Y. 159 pages. Price, $2.50.

If there is any sinister meaning attached to the word propaganda, Edward L. Bernays can find little justification for it, for to him propaganda has become a national interpreter explaining new ideas and working toward a productivity that will eventually bring order out of chaos. Thus does he in "Propaganda" which he terms "The Public Mind in the Making," see this influence as immortal.

The author, whose book "Crystallizing Public Opinion" has been widely read, says that his purpose in the later work was to explain the structure of the mechanism which controls the public mind and to tell how the special pleader and propagandist seeks to create public acceptance for a particular idea or commodity. And why not? As it would be impossible for all men to study for themselves the difficult social, political and business problems of the day, a man is satisfied to have objects and ideas brought to his attention through the agency of propaganda. How entirely the public has become subjects of dictators and new propagandists, who win the public mind over to concentration on some particular idea or object is shown in some pertinent examples. He draws a clear picture of the present-day public relations counsel and explains his efforts to analyze his public.

In fact, after a reading of this book, one might say there is propaganda in everything, or rather nothing is without propaganda. The author shows its potency in business and its relations with the public, in politics in its "drive for votes," in education in an effort to make the public understand the relationship between the general public and the academic idea. Social service, too, needs propaganda activities, whether it be a campaign to preserve the teeth or one to urge the laying out of better parks. To win public approval of an unknown artist's canvases, an intensive propagandizing effort must also be made.

After an intensive study and comprehensive survey of the methods and motives of propaganda and its agents, Mr. Bernays concludes that as a consistent, enduring effort to create or shape events to influence the relations of the public to an enterprise, idea or group, propaganda will eventually bring order out of chaos.

"Appointments For 1929"

In a decorative cardboard cover and with half-tone cuts in sepia reproduction, "Appointments for 1929" is a pretentious piece of printed matter, the work of the London Underground System, London, England. It includes a calendar of London's beauty with occasional comment from the best authors. The illustrations, on highly coated stock, alternate with text on antique stock. Some well-known works of art are reproduced whose originals are in the Tate Gallery, National Gallery, British Museum and in London life as it appears today. The inside back cover shows the original manuscript of the National Anthem by Dr. Arne. One especially attractive page shows the Lely Beauties at Hampton Court (reproduced by gracious permission of H. M. The King).

C S S & S B R R

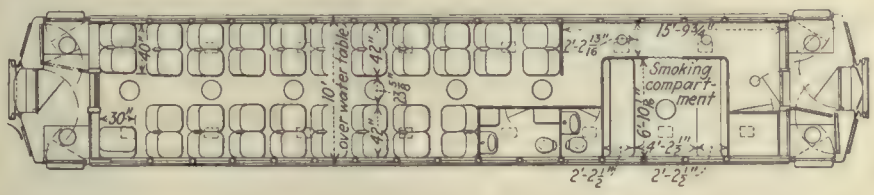
— — — a lot of letters
and — — a lot of sense

— — *for they specified*

"PEACOCK" STAFFLESS BRAKES



on ten new interurban cars





Five motor equipped cars and five trailers are being built for the Chicago, South Shore and South Bend Railroad, Michigan City, Indiana. The motor equipped cars weigh 133,600 lbs. each, the trailers somewhat less. In either case, a lot of weight to stop with ordinary hand brakes. No job at all for Peacocks, though. That's one of the many reasons they were specified. For Peacock Staffless Brakes have plenty of power, lots of speed and an exceptionally long maintenance-free life. And yet they are very light in weight and occupy small platform space.

NATIONAL BRAKE COMPANY, Inc.
890 ELLICOTT SQUARE, BUFFALO, N. Y.

Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.

General Sales Representatives
The Ellcon Co., 50 Church St., New York

Send passenger-miles *up*
and operating costs *down*



with

TIMKEN WORM DRIVE

for electric railway cars

To get more passengers for your cars by giving them quiet, smooth, satisfying transportation; to cut down car-weight; to reduce power consumption by virtue of the lower weight and the high efficiency of the driving units; to prolong the life of cars and rails; in short, to send passenger-miles and revenue *up*, and operating costs *down*—

Timken
Worm Drive
Car Trucks

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

TIMKEN AXLES

SIGHT-SEEING TOURS . . . . . ATLANTIC CITY . . . . . MIAMI



WHITE WAY TOURS INC.

A FINER SIGHT-SEEING BUS



The only bus, so far as we know, that is equipped with an amplifying loud speaker announcer. The driver keeps hands on the wheel, facing forward, watching the road at all times. This device saves the operator the expense of a lecturer and adds another paying passenger to the bus capacity. The inside width of this "Palace Highway Pullman" exceeds any bus built for the same outside dimensions, giving wider seats and wider aisle and meaning increased passenger comfort and rider appeal.

J. C. CAMPBELL, President of White Way Tours, Inc., believes in giving his patrons the greatest comfort and convenience available.

His new luxurious Bender Bodies are the last word in easy riding, beauty of design and passenger convenience.

They have extra thick seats with double air spring cushions, big heavy balloon tires; such conveniences, too, as ice cold drinking water; hangers on back of seats for coats and wraps and amplifying announcing device for driver. For protection—double guard rail along each side and non-shattering glass in the windows.

Comfort—convenience—protection—typical of Bender construction . . . these are what build bus business.



This is the type of coach which is being so successfully operated all over the country for the handling of long distance passenger traffic because of its exceptional seating and inside luggage facilities, also commodious aisle with full head room.

THE BENDER BODY CO.
W. 62nd and Denison, Cleveland, Ohio

BENDER BODIES

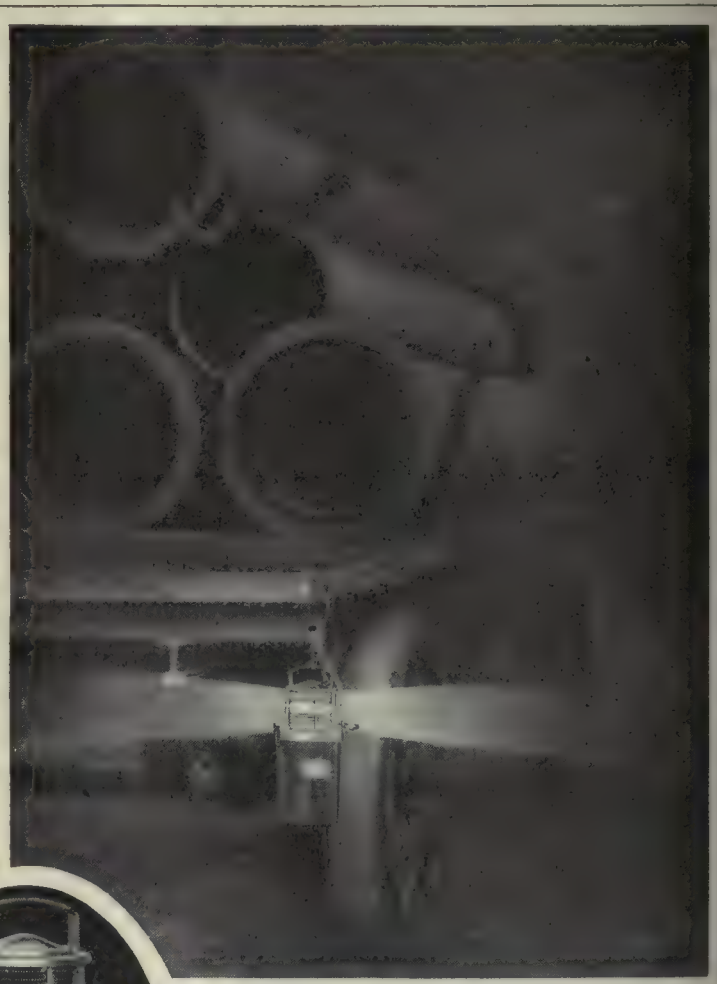
Wind and Rain can't blow out *this* warning

THE NEW EVEREADY PORTABLE FLASHER

BLIZZARDS blow . . . driving sleet . . . freezing into ice as soon as ground is touched. Through the whole night the Eveready Portable Flasher shoots out its warning flashes. *This is one flasher that cannot be drowned out or blown out.* The Eveready Portable Flasher is as sure, as dependable, as certain in January snow storms as on the gentlest night in June.

Eveready Dry Cells — four of them — insure constant flashing in the wettest and windiest weather.

A warning light is a guardian of human life. The absolute, unwavering dependability of such a light is more important than any other consideration. Eveready Portable Flashers are more dependable than oil lamps and can be serviced for only $10 a year. Sold through National Carbon Company distributors.





Specifications: Height 16 inches. Diameter of base 7 inches. Weight, including batteries, 16½ pounds. Requires four standard Eveready 6-inch Dry Cells connected in series to deliver 6 volts. Extra 6-volt lamp inside battery housing. Battery compartment constructed of seamless steel attractively finished in red. Top of flasher cadmium plated for weather protection. Heavy fresnel type red glass lens. Padlock for battery compartment with an extra-long hasp so that the device can be chained. This flasher is of rugged construction throughout and entirely weather-proof.

NATIONAL CARBON COMPANY, INC.
New York, N. Y.

Branches

Atlanta Chicago Kansas City
Long Island City San Francisco

Unit of Union Carbide and Carbon Corporation

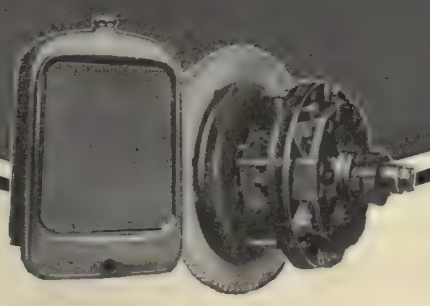
EVEREADY
TRADE MARK
PORTABLE FLASHER
—dry battery operated

LONG

PRODUCTS

Automotive
CLUTCHES
and
RADIATORS

THE LONG MANUFACTURING CO.
DETROIT, MICHIGAN





Gasoline Performance

INFLUENCES MOTOR OIL EFFICIENCY

Especially in Winter

A GASOLINE that will not ignite readily, when the thermometer starts sinking below the freezing point, that requires excessive use of the choke, unquestionably lowers the efficiency of your motor oil by causing excessive dilution.

Just as a matter of good business you should demand that the gasoline you use during these Winter months has the necessary qualities for satisfactory cold weather service. Abundant proof is available that Red Crown Gasoline will meet your requirements. It has every quality necessary for efficient Winter performance. Low initial boiling point gives quick vaporization, even in the coldest weather. The perfect chain of boiling points that further characterizes this fuel assures quick acceleration, maximum power and clean combustion.

This quick ignition and pick up of Red Crown Gasoline reduces to a minimum the use of the choke. The motor oil, as a result, maintains its lubricating qualities over greater mileage, with a consequent lowering of lubrication costs and a lessening of the hazard of burned bearings.

Test Red Crown in one of your buses and watch it perform.

STANDARD OIL COMPANY *(Indiana)*

General Offices: 910 South Michigan Ave. Chicago, Illinois

ILLINOIS	INDIANA	IOWA	S. DAKOTA	N. DAKOTA	MINNESOTA	MISSOURI
Chicago	Evansville	Davenport	Huron	Fargo	Duluth	Kansas City
Decatur	Indianapolis	Des Moines	MICHIGAN	Minot	Mankato	St. Joseph
Joliet	South Bend	Mason City	Detroit	WISCONSIN	Minneapolis	St. Louis
Peoria	KANSAS	Sioux City	Grand Rapids	La Crosse		
Quincy	Wichita		Saginaw	Milwaukee		
				Green Bay		

809



ever has the Industry awarded such quick and decided approval to any new coach . . . . . .



8 cylinder
TYPE W

Never before....

Never before in motor coach history has any new coach won such prompt approval or complete acceptance as the new Yellow, 8-cylinder Type "W." Even before this new coach was in actual production, prominent operators, familiar with the specifications and high standards of engineering excellence to be followed, placed their orders "for delivery as soon as possible."

Other operators, anxious to see how the new coach would perform, waited until they had seen it in actual service. Then followed in rapid succession order upon order and insistent demands for immediate delivery.

By December 31st, *within 90 days after its introduction,* 17 different Electric Railway Companies, 4 Steam Railway Companies and 32 Independent Operators and others, listed on the opposite page, had voiced their approval of the new Type "W" by placing orders for immediate deliveries.



To Electric Railways

Department of Street Railways, City of Detroit	40
Public Service Transportation Co, Newark, N. J.	21
Eastern Michigan Motorbuses, Detroit, Mich.	32
Midland Trail Transit Co, Charleston, W. Va.	10
Toronto Transportation Commission, Toronto, Can.	6
Saginaw Transit Company, Saginaw, Mich.	5
Southern Public Utilities Co, Winston-Salem, N. C.	5
Waterloo, Cedar Falls & Northern Railway Co, Waterloo, Ia.	3
Cedar Rapids & Iowa City Railway, Cedar Rapids, Ia.	2
Montreal Tramways Company, Montreal, Canada	2
Erie Railways Co, Erie, Pa.	2
Springfield Traction Co, Springfield, Mo.	1
Pittsburgh Motor Coach Co, Pittsburgh, Pa.	3
Johnstown Traction Co, Johnstown, Pa.	6
Wheeling & Parkersburg Motor Transportation Co, Tyler, W. Va.	1
Washington Railway & Electric Co, Washington, D. C.	6
Valley Bus Co, Cincinnati, Ohio	3



To Steam Railroads

Southern Pacific Motor Transport Co	10
Southwestern Transportation Co	4
Yadkin Coach Co. (Southern Railroad)	2
LaCrosse & Southeastern R. R. Co	3

To Other Carriers

Marion Rapid Transit Co, Marion, Ohio	12
Twin Cities Coach Co, Camden, N. J.	10
Motor Transit Management Co, Chicago, Ill.	7
Rex Finance Corporation, Chicago, Ill.	9
Somerset Bus Co, Somerset, Pa.	3
King Bros, Lebanon, Ohio	2
Vancouver Island Motor Coach Co, Victoria, B. C.	2
Tri-State Transit Co, Shreveport, La.	2
Richmond-Washington Motor Coaches, Alexandria, Va.	2
Tennessee Coach Co, Knoxville, Tenn.	2
Buffalo Interurban Bus Co, Buffalo, N. Y.	2
White Star Line, Maryville, Tenn.	1
County of Los Angeles, Los Angeles, Cal.	1
Royal Hawaiian Transport, Honolulu, Hawaii	1
St. Mary's School, Katonah, N. Y.	1
Absecon Bus Co, Absecon, N. J.	1
Intermountain Transportation Co, Anaconda, Mont.	1
General Motors Proving Ground, Milford, Mich.	1
Jahns Bus Co, La Porte, Ind.	1
Olympia, Gray's Harbor Transportation Co, Olympia, Wash.	1
General Motors Export Corporation, Sweden	1
Washington Motor Coach Co, Wheeling, W. Va.	2
Empress Taxi & Sightseeing Co, Victoria, B. C.	2
Bendix Brake Co, Detroit, Mich.	1
The Ohio Bus Line Co, Hamilton, Ohio	3
White Transit Co, Wilkes-Barre, Pa.	1
Stillman B. Jamieson	1
Provincial Motor Transportation Co, Montreal, Canada	30
Camel City Coach Co, Winston-Salem, N. C.	5
Washington Transportation Co, Washington, Penna.	2
North Bend Stages, Seattle, Wash.	1
Colonial Motor Coach Corp, Watertown, N. Y.	6

Three 8 Cylinder models to choose fr



The full headroom, 21-passenger City Service Coach



The 17-passenger Parlor Coach



The Observation Parlor Coach has full headroom, is 90 in. wide and accommodates 21-seated passengers



IN ALL Type "W" models practical operating utility has been combined with the features that attract and please passengers.

Beauty, performance and safety, are outstanding characteristics and to these have been added many practical refinements of design and construction that insure low maintenance costs and long life.

No wonder the industry bought from the day the Yellow Type "W" was announced.



General Motors Truck Company
Pontiac, Mich.

YELLOW
Type "W" Coaches



THE big swing to General has come as a result of a specialized service in tackling the toughest jobs and delivering the longest uninterrupted mileage. ~ ~ The General dealer knows how to properly fit the tire to the job, with the result that operators everywhere are taking advantage of this experience in reducing operating costs.

THE GENERAL TIRE AND RUBBER COMPANY, AKRON, OHIO



The Mark of Leading Tire Stores Everywhere

The Heavy Express Special

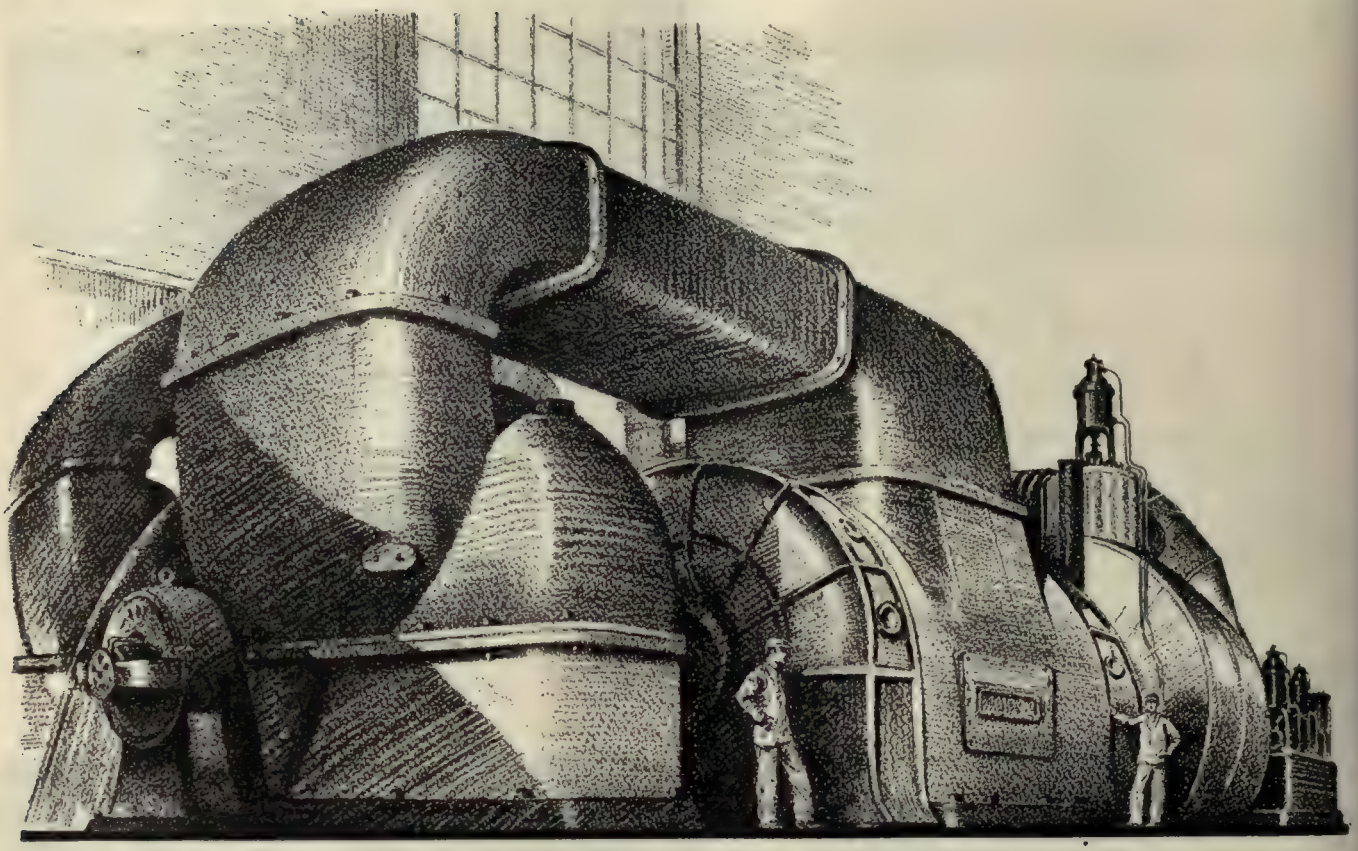
Specially built to stand up under the load at express speed, the Heavy Express Special carries through on any job. Operators everywhere are swinging to it.

The

GENERAL

TIRE

—goes a long way to make friends



No. 8 at Hell Gate

An epoch-making engineering achievement

The American Brown Boveri steam turbo-generator recently installed at the Hell Gate Station of the United Electric Light and Power Company of New York is the largest steam turbo-generator in the United States.

Its capacity is at least sixty per cent larger than any American unit now in operation. It also has the highest capacity per square foot of floor space. The space was planned to produce 30,000 kilowatts. But in that space American Brown Boveri has placed equipment producing 160,000 kilowatts.

Judge its immensity by these indices:

Steam: 1,710,000 lbs. (77 tons) per hour

Water: (for boiler feed) 216,000 gallons per hour—60 gallons per second

Water: (cooling—for condenser) 13,000,000 gallons per hour—enough for a city of 200,000 population

Oil: (for lubricating bearings and operating valves) 800 gallons per minute

Air: (for ventilating alternators) 274,000 cubic feet per minute

Turbine Efficiency: 84.5 per cent—the highest in the United States

TRULY an achievement of which to be justly proud.

AMERICAN BROWN BOVERI ELECTRIC CORPORATION, CAMDEN, N. J.

AMERICAN BROWN BOVERI



OUT of the past, abreast of the times and into the future. So moves the pendulum of progress. For more than twenty-five years Tuco has rendered a service to the car builders that has helped them solve their car flooring problems. Today and in the future Tuco engineering service is always ready to help you. The fact that Tuco Flexolith Flooring has been used in nearly 50,000 cars and buses, clearly shows that Tuco can fulfill your needs. The problem of selecting the right flooring for your cars is often quite a task. With the hard usage that flooring is subject to under modern transportation methods, one needs to know whether or not the materials used will stand up under the strain. Before making your decision, let our service department study your needs and we feel sure that Tuco will solve your problems.

TUCO PRODUCTS CORPORATION

Executive Offices, 30 Church Street, NEW YORK

80 East Jackson Blvd., CHICAGO, ILL.
915 Olive Street, ST. LOUIS, MO.
630 Louisiana Ave., WASHINGTON, D. C.
751 Monadnock Building, SAN FRANCISCO, CAL.

MONTREAL, CANADA ST. PAUL, MINN. LOUISVILLE, KY. HOUSTON, TEXAS BOSTON, MASS.

Better Bonds and Bonding



Type EA: One of the Many Erico Brazed Bonds.

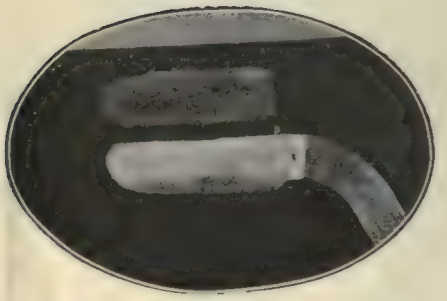
LOW cost installation, speed of application, permanent conductivity, feature all types of Erico Brazed Bonds. Erico Brazed bonds cannot be removed from the rail except by actual mutilation. This means lower maintenance cost, decreased replacement, and minimum of inspection attention.

To make bonding even easier and less expensive we designed and introduced the Erico SBR Welder, providing a complete brazed bonding outfit in a single portable unit.

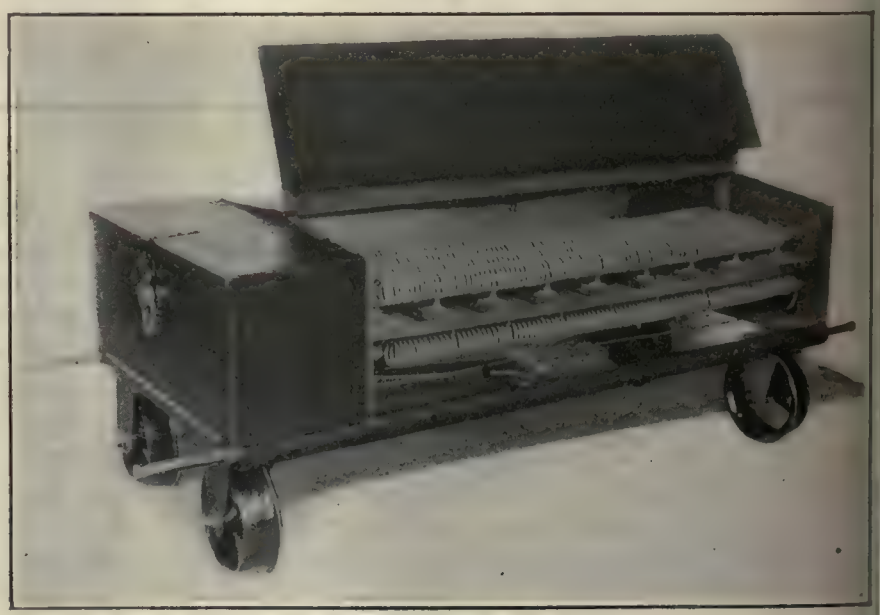
Arranged with storage space for tools and supplies, it is quickly moved from joint to joint. Set up over the bond the action is automatic. In a few seconds the braze is finished, and the bond becomes an integral part of the rail. Better Bonding is thus unavoidable.

Let us explain the details of this unique combination for better bonds and bonding. Write.

The Electric Railway Improvement Company
2070 EAST 61st PLACE CLEVELAND, OHIO



As evidence of Erico bond and bonding efficiency, over 30,000 lbs. were required to share this brazed bond terminal from the rail. Permanency is guaranteed. The area of copper left on the rail was just 8 times the cross-sectional area of the bond conductor. This ratio of copper to steel assures maximum bond conductivity.



Erico SBR Brazed Bonding Outfit

ERICO
RAIL BONDS AND BONDING OUTFITS



Differential Electric Dump Car

Dumps either side—no labor required—places material clear of trench—load distributed as desired—material placed on job at a gross cost of less than 2 cents per ton mile.



Clark Concrete Breaker

Breaks concrete at less than 2 cents per track foot. Protects man-holes, underground conduits, etc. Fast and economical.

Improved Transportation

Means More Riders—More Revenue

The basis of improved transportation is better track. To be able to lay track economically, makes it possible to provide more new track. Makes possible better maintenance of old track.

All of which means improved transportation—more riders—more revenue.

The Differential Method Is Approved And Employed By More Than 65 Electric Railways

Let us show you figures, and explain the economies that will accrue to you through the use of the Differential track laying method. Write.

THE DIFFERENTIAL STEEL CAR COMPANY
FINDLAY, OHIO, U. S. A.



Differential Electric Locomotive Crane Car

Handles rails, special track work, ties, bridge timbers, poles, etc. Capacities: 5 tons at radii up to 36 ft., 2½ tons at radii up to 44 ft.



Differential Body, 3-Way Dump

Dumps left, right, rear. Patented down-folding door slides loads clear of wheels. Great in close quarters or when track is torn up.



American

The Latest Triumph Of Braking

PROVIDING quietly certain—velvet stops—through long life—The American Brakeblok is the brake material ideal.

Sure footed braking for your bus, such as modern speed and traffic demand, is now yours in Brakebloks. Will not burn, even though subjected to the most extreme brake heat—hold though wet—have set a new standard of brake efficiency and wear.

Developed through thousands of experiments upon hundreds of materials, Brakebloks are the latest triumph of a group which has behind it over 30 years of acknowledged leadership in braking.

American Brake Shoes are used to stop the thundering tons of the modern passenger train, both steam and electric. This colossus of the rails could not exist had not this organization produced the continual necessary improvement of the brake shoe to stop them.

American Brakebloks were first shown to the world of transportation at the A. E. R. A. convention two years ago.

But we did not rush them to the market. In the intervening years we spent our own money—our own time in testing—testing—testing—to be sure we could offer the transportation industry braking material up to our standard in the railway field.

Brakebloks were tested—not on one bus, but on scores—not on one make but many—not on one type of road, but every type and grade the nation offers.

The following manufacturers have adopted American Brakebloks as standard or optional factory equipment:

American Car & Foundry Motors Co.
Autocar Co.
Dodge Bros. (De Luxe Busses)
Fageol Motor Co.
Federal Motor Truck Co.
Fruehauf Trailer Co.
General Motors Truck Co. (Yellow Coaches)
Kleiber Motor Co.
Mack Trucks, Inc.
Moreland Motor Truck Co.
Twin Coach Co.
C. H. Will Motors Corp.
White Co.

If you wish to know more about Brakebloks, let us send you complete information, including the reports of service by operators and manufacturers.

AMERICAN BRAKE MATERIALS

Subsidiary of
The American Brake Shoe and Found
Main Office and Factory
Detroit, Michigan
Sales Offices: New York City; Chicago, Illino

Brakebloks

Of 30 Years Leadership

Brakebloks are made in a variety of widths, thicknesses, lengths to fit any existing brake assembly.

You may obtain Brakebloks on new buses or trucks by specifying them to your manufacturer. For re-equipping existing rolling stock, we will place you in touch with a distributor.

Outstanding Characteristics of Brakebloks

¶A constant friction throughout their entire life.

¶Durability far in excess of any other frictional material.

¶No metallic content to cut or score drums.

¶One hundred per cent recovery from the effects of water, oil, or grease.

¶Will not burn or smoke, grab or squeal.

¶Will not deteriorate under heat and will withstand temperatures far in excess of any other frictional material and greater than encountered in the most severe service.

¶Non-compressible and will hold shape under any pressure.



MANUFACTURERS—

With braking materials we have studied brake drums and braking problems generally.

The information gained will be placed at the disposal of any bus manufacturer needing it.



CORPORATION

ompany

Francisco, Calif.

Greetings for the New Year



New policies should include the adoption of Consolidated Electric Heaters and Pneumatic Door Operating Equipment with treadle operated doors.

CONSOLIDATED
CAR HEATING CO., Inc.
New York Albany Chicago

COWDREY

BRAKE TESTERS

are cutting maintenance expense for these companies

Argentine	Anglo-Argentine Tramways Co.	Buenos Aires
Arizona	Pickwick Stages System	Phoenix
Brazil	City of Santos Improvement Co., Ltd.	Santos
California	Pickwick Stag s System	Los Angeles
	Los Angeles Railway Corp.	Los Angeles
Canada	Toronto Transportation Commission	Toronto
	DeLuxe Cab Company	Montreal
Connecticut	Connecticut Company	Hartford
District of Columbia	Capitol Traction Company	Washington
	Washington Railway and Electric Co.	Washington
Florida	Miami Beach Railway	Miami
Illinois	Motor Transit Management Co.	Chicago
Indiana	Shore Line Motor Coach	Gary
Louisiana	New Orleans Public Service, Inc.	New Orleans
	Toye Bros. Yellow Cab	New Orleans
Maryland	Baltimore Coach Co.	Baltimore
Massachusetts	*Boston Elevated Railway	Boston
	Springfield Street Railway Co.	Springfield
	Worcester Consolidated Street Railway Co.	Worcester
Michigan	Greyhound Lines	Detroit
Minnesota	Northland Transportation Co.	Minneapolis
	Yellow Cab Co.	Minneapolis
	Transit Supply Co.	St. Paul
	Yellow Cab Co.	St. Paul
New Jersey	†Public Service Coordinated Transport	Camden and Newark
New York	Northern New York Development Co.	Albany
	United Traction	Albany
	International Bus Corp.	Buffalo
	Bee Lines, Inc.	Jamaica
Ohio	*Northern Ohio Power & Light Co.	Akron
	City Transit Co.	Norwood
	Youngstown Municipal Railway Co.	Youngstown
Pennsylvania	†Philadelphia Rapid Transit Co.	Philadelphia
	Quaker City Cab Co.	Philadelphia
	*Yellow Cab Company	Philadelphia
	Aronimink Transportation Co.	Llanerch
	Equitable Auto Co.	Pittsburgh
Rhode Island	United Electric Railways Co.	Providence

* More than one equipment but less than five
† Five or more

Let us show you how Cowdrey Brake testers will save money for you, too. Write for 36 page manual on scientific brake measurement.

Cowdrey Brake Tester Organization, Inc.
Fitchburg, Massachusetts

Sold by

Firestone Tire and Rubber Co., Akron, Ohio.
Firestone Tire and Rubber Co., Ltd., Hamilton, Ontario, Canada.
Hegeman-Castle Corporation, Chicago, Ill.
International General Electric Company—Schenectady, New York.
National Railway Appliance Co., New York, Boston, Washington.



FUTTUR

MASSA, Central Africa, is noted for its deposits of futtur—clay of a peculiar kind that is edible.

As a result, in Massa there is no waste.

The pottery when broken is simply served up as a course for the next meal.

And this we choose to choose for a paragraph or two on elimination of waste—especially as related to carbon brushes.

It has always been the aim of Morganite engineering to produce a brush to cut out waste.

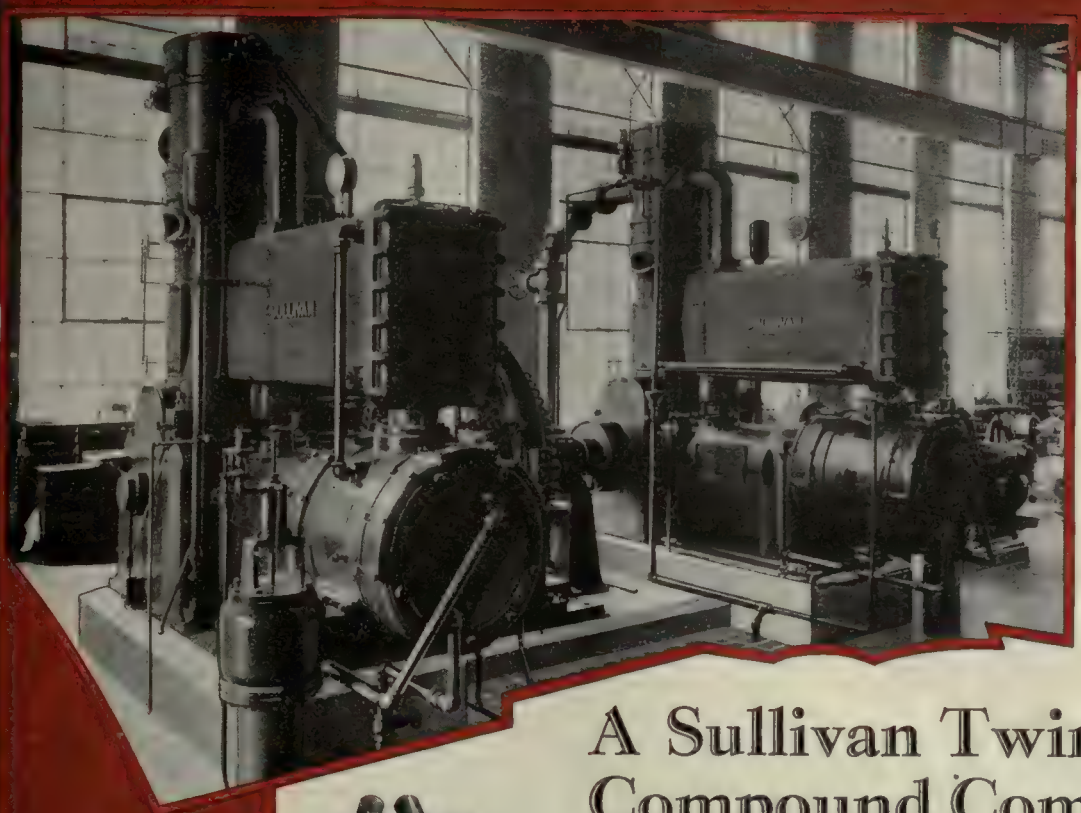
A notable example is found in the Morganite development to prevent side wear of brushes.

While the saving from the epicurean standpoint is not as thoroughly complete as that in Massa pottery—yet the money saving is far more—enough to enable us to supply you with a massa evidence on the subject.

Morganite Brush Co., Inc.

Main Office and Factory at 3302-3320 Anable Ave., Long Island City, N. Y.

DEPEND ON SULLIVAN AIR POWER



A Sullivan Twin-Angle Compound Air Compressor in a plant of the General Motors Corporation

A Sullivan Twin Angle Compound Compressor

in a large Ohio Automobile Plant

THE business outlook for 1929 is good. And transportation, as usual, will play a vital part in the movement of people and commodities.

Greater business will mean more car and bus maintenance—and more construction. But many companies will keep down these costs with air power.

Air power supplied by modern Sullivan Compressors is cheap. And there is a compressor of size, type, and drive, exactly suited to your needs.

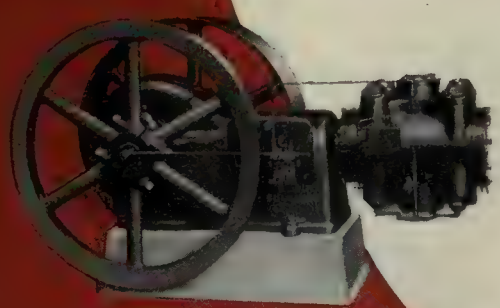
Angle Compound Compressors, single-stage horizontal, and single-stage vertical machines of many sizes give you a range of capacities from 68 to 5100 cu. ft. per minute; with drive by belt or direct connection to motor or oil engine.

Investigate the uses of compressed air. A Sullivan Air Power Engineer will help you plan for 1929—to make greater business mean larger profits.

Catalogs on Request



240-ft. 4-cylinder Balanced-V-Type Compressor



Belt-driven horizontal compressor, capacities 68 to 500 ft.



310-ft. Portable Balanced-V-Type compressor on steel wheels

SULLIVAN MACHINERY COMPANY
150 S. MICHIGAN AVE., CHICAGO

SULLIVAN TRADE MARK

BUDA

ESTABLISHED
1881

Wherever Rails Cross



THE BUDA COMPANY

HARVEY [Chicago Suburb] ILLINOIS

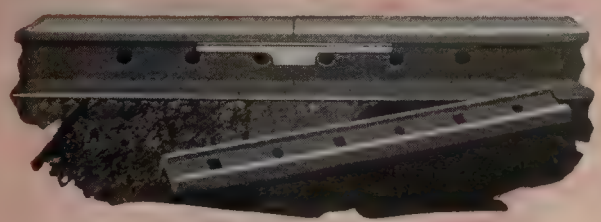
TRUE TEMPER TAPERED RAIL JOINT SHIM



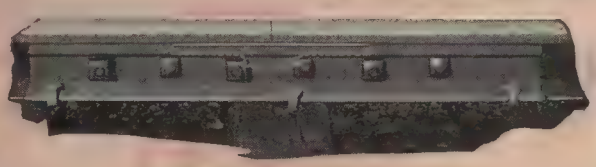
The Remedy for low joints caused by wear



Low Joint conditions quickly and economically corrected by application of True Temper Tapered Rail Joint Shim



True Temper Tapered Shim in position with angle bar removed



Shim shown in position between rails and angle bar

The American Fork & Hoe Company

General Offices: Cleveland, O. *Factory:* North Girard, Pa.

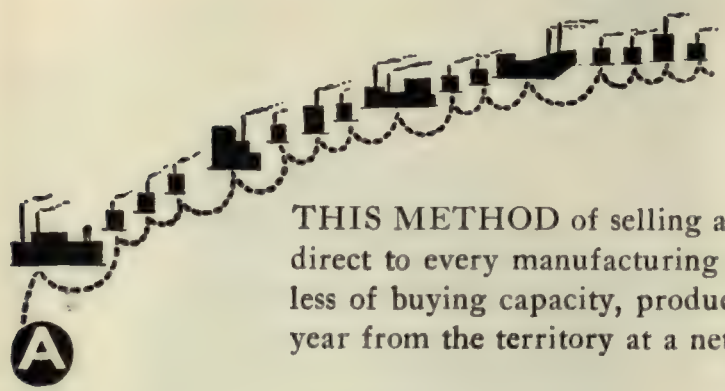
District Offices
Whitehall Bldg., New York, N. Y.—Railway Exchange Bldg., Chicago, Ill.

Representatives at
Boston, Detroit, Minneapolis, St. Louis and San Francisco

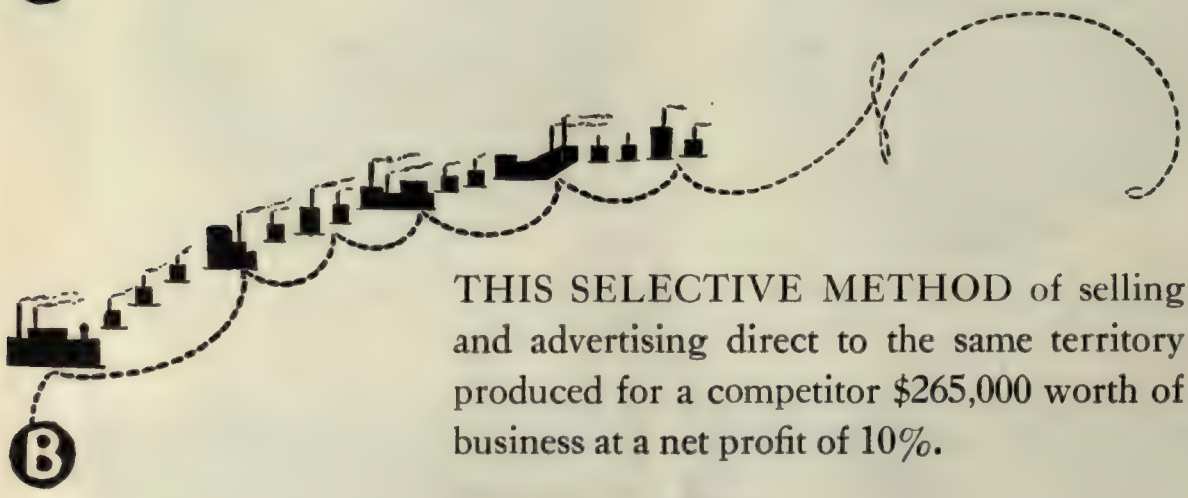
FOREIGN REPRESENTATIVE:
WONHAM, INC., 44 WHITEHALL STREET, NEW YORK, N. Y.

This is one of a series of McGraw-Hill advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

VOLUME *vs.* PROFITS



THIS METHOD of selling and advertising direct to every manufacturing plant, regardless of buying capacity, produced $250,000 a year from the territory at a net profit of 2%.



THIS SELECTIVE METHOD of selling and advertising direct to the same territory produced for a competitor $265,000 worth of business at a net profit of 10%.

Practical Industrial Advertising Coverage, like practical sales coverage, is a problem of selecting the plants with buying capacity and directing sales and advertising effort thereon.

You are invited to make at any time a personal inspection of McGraw-Hill circulation methods which produce the Practical Industrial Advertising Coverage illustrated in "B."

—The publishers

B-1



QUALITY INSULATION
with
NATIONAL DISTRIBUTION

The ever-growing and extending recognition of Okonite Quality insulation for all wires and cables has been equalled by the service behind this splendid product. Service is maintained and buying facilitated by the establishment of branch offices and agencies in every section of the country. These offices are the extension of our factories and your every requirement will be met wherever an Okonite office is located. Our entire organization is placed within your reach in any one of the following cities:





New York	Pittsburgh	Chicago
Atlanta	Birmingham	Boston
Dallas	Los Angeles	St. Louis
San Francisco		Seattle

The Okonite Company

The Okonite-Callender Cable Company, Inc.

Factories: PASSAIC, N. J. PATERSON, N. J.

Agents:

Philadelphia—Novelty Electric Co.
Montreal—Engineering Materials, Ltd. Cincinnati—F. D. Lawrence Elec. Co.
Havana—Victor G. Mendoza Co.

OKONITE PRODUCTS

OKONITE INSULATED WIRES AND CABLES
OKONITE INSULATING TAPE
OKONITE CEMENT
VARNISHED CAMBRIC CABLES
MANSON & DUNDEE FRICTION TAPE
OKOCORD
OKOLOOM

OKONITE-CALLENDER PRODUCTS

IMPREGNATED PAPER CABLES
SUPER-TENSION CABLES
SPLICING MATERIALS

NUMBER CONTROL

And Various Ways to Apply It

IT IS part of our business to know the new uses that properties everywhere have developed for the ticket or transfer number. Just a few examples indicating the range of these uses:

Quick counting; auditing of unsold returns against cash deposit; absolute identity of tickets issued to barns, to individual employees, to outside agencies; check on outstandings; detection of counterfeits (also by date, line or point of origin); tracing illegal resale; prevention of unauthorized ordering; traffic studies by zones, by class of rider; popularity of an experimental fare plan—any purpose, inside or outside, where it is necessary to trace specific identity.

Few properties are without the protection of number control. Are you getting the most out of the number's possibilities through Globe advisory service and accuracy?

Books—Strips—Transfers—School Tickets—Employees Pass—Weekly and other Passes—Zone Checks—Commutation Forms—Duplex Receipts—Limited Passes.

WHAT OTHERS say about how they use numbers

A SOUTHERN PROPERTY

"This Company has always used the numbered paper ticket, and we feel that there is a protection in the use of a ticket that is cancelled after it has been accepted for transportation.

"We also feel that numbering a ticket affords a protection and simplifies the accounting and auditing, and enables us to check up and obtain the outstanding at any time by the change of color and series."

A LARGE USER

"The Accounting man makes notes of the tickets received, and the numbers of the tickets. From this information he makes a memorandum account charging these numbers from blank to many our Treasury Department with so many tickets, numbers from blank to blank, inclusive. The Treasury Department, as sales are made, furnishes the Accounting Department memorandum of tickets sold. Department from blank to blank. The Accounting Department in turn credits the numbers from blank to blank. The Accounting Department with numbers blank to blank.

"By keeping the accounting in the above manner we can tell at anytime the approximate highest number outstanding of the series. Each day we scrutinize the number, and see that no number is higher than the approximate last number sold, kind of tickets, and the cancellation made by our trainman.

"Our accounts covering the sale of tickets are compared with the memorandum account of the Treasury Department at various intervals to detect whether counterfeit tickets have been placed on the market."

THE AGENCY SYSTEM

"Our problem is to keep the storekeepers from using our money to pay special bills, to keep the clerks of the various stores from stealing the tickets and selling them at a lower price, and to check up our two delivery men, who operate Ford trucks and do nothing else but sell tickets to these different accounts and make collections.

"It would be utterly impossible to do without a number on our tickets.

"This method of selling tickets speeds up fare collections tremendously. By having distributing stations in almost every drug, cigar, department and grocery store of good rating, we get a corresponding pro rata distribution of good will."



Factories:
Philadelphia
Boston
New York
Los Angeles
Atlanta

Globe TICKET COMPANY
Philadelphia

Sales Offices:
Baltimore
Cincinnati
Cleveland
Pittsburgh
Albany

Public approval

A City

ter a Trial
Coaches Win
Vote of Riders

ssengers on the deluxe coache
he D. S. R. which began opera
n on Woodward avenue Sunda
replace the jitneys reported 3
e ratio of 10 to 1 in favor of the

aches.

AST SERVICE.

RUSSELL A. HART, 16814 Prince-
on avenue—The coaches are fine. I
rode from the Six-Mile road to the
City Hall in 27 minutes. The jitneys
couldn't beat that. And these
coaches certainly were built with a
view to making the passengers com-
fortable.

AS GOOD IN TRAFFIC.

T. GEORGE STERNBERG, 249
Theodore street—The coaches run
in and out of traffic as smoothly and
did. The
table and
a seat to
The coach
d efficient.
n the long

H PATRONAGE
OWS AN INCREASE

ce To Start on Grand
River Next Sunday.

eport issued today by Del A.
, general manager of the De-
ment of Street Railways, shows
ady increase in the number of
engers carried by the new de
coaches in Woodward avenue
e they were put in operation
Sunday.
hirty coaches, having a capacity
al to 70 jitneys, now are in op-
tion. Sunday they carried 4,000
rsons; Monday, 5,873 and Tues-
y, 6,621.
Mr. Smith said he had no accurate
nformation on the number of per-
ons carried daily by the former

ast Grand
make fine
is a diffi-
affic. Why
cars from
ress service
t? I believe
care of the
jitneys but
cessary con-
cars are off

IDES, 130
convenience
hes are

SES CARRY RE
,177 TUESDAY

evenue from the new D. S. R.
uxe buses on Woodward avenue
ncreasing daily, Del A. Smith,
S. R. general manager, said
ay, adding the gross earnings of
e buses per mile also is rising
ch day.
Monday, the second day of oper-
tion, 20 buses were
esterday 23 bu
ionight, S

Saturday, November 24, 1928

20 'DE LUXE' BUSES TO START TOMORROW

New Buses on Grand River Make Hit With Riders

Nearly 5,000 persons used the
w de luxe bus service on Grand
er avenue yesterday, the open-
day of the new service, Del A
th, general manager of the D.
R., said today.
nother step to expedite traffic
rand River avenue was being
out today by police traffic
Officers were assigned
the left of the zones when no street
cars were approaching.
Inspector Edward A. Mitte, po-
lice traffic director, admitted the
move was a violation of a city
ordinance forbidding drivers to go
to the left of the zones, but said
police were permitted to use their
judgment in this case.
"We found, this morning, that

- BUS RIDERS LIKE
DE LUXE COACHE

Opening of Service Well Pa
tronized, Says Smith.

An encouraging response by the
public was given the inauguration
of the new de luxe coach service on
enue Sunday, Del A. Smith,
anager of the D. S. R.,
Ten coaches were oper-
lay and because of the
and this morning two
added. More buses will
the line as the demand
Mr. Smith said.
hes start at Alter road
west on Mack avenue
t avenue, on Mt. Elliott
ongress street, and on
est to Cadillac Square,
ver the same route.
said he believes the
be as popular as the
service on w



DODGE
MOTOR

Pays Tribute

New Coaches Win Praise of Press and Public

THE public is quick to appreciate and to patronize better transportation service. De luxe Dodge Brothers Parlor Coaches meet with favor wherever they are operated.

Some of the clippings from Detroit newspapers, reproduced here, are indicative of the reception accorded the 120 new parlor coaches recently purchased by the Department of Street Railways.

Public approval is the same everywhere. Dodge Brothers Motor Coaches attract patronage by their fine appearance—and hold patrons by their speed, safety, comfort and dependability.


COACH SERVICE GETS WELCOME

20 Vehicles Are Operatinn Woodward; Grand River L To Be Started Next Sund

Deluxe coach service, inau yesterday on Woodward ave 15 vehicles of 16-passenger each, and increased to 2 today, is meeting with " immediate resp fro lic, Del of

NEW COACH LI OPENS SUNDA

Lines To Be Star 42

NEW COACHES WIN THE RIDERS

Inspection of Added Service Shows Response 'Kindly and Immediate.'

With 25 vehicles of 16-passenger capacity operating on the new Woodward avenue de luxe coach line, the D. S. R.'s plan for the substitution of the outlawed jitneys is meeting with "kindly and immediate response" from the public, Del A. Smith, general manager of the Department of Street Railways, said following an inspection of the

TESTS SERVICE.

John J. Gorman, member of the Street Railway Commission, was a passenger Monday afternoon on one of the new coaches. Calling later at the office of Mayor Lodge, he expressed himself as "pleased with the new service."

"I entered a de luxe coach at Woodward avenue and Grand boulevard," Mr. Gorman said, "where I obtained the last available seat. The rule that no passengers be carried standing meant but few stops between that point and the City Hall, so that the trip was a fast, comfortable ride. Others ridin same coach were frank ing their approva "The servi so that

MS BUSSES OVE SUCCES

R. Executive Se Rush Hour Is by New S

De luxe moto oodward ave treet railwa atisfactory ing the n and thro Manage R. a buss S the io ati se c

'DE BUSES TOMOR

The traveling was awaiting its fi ride in the "de which the D. S. R. tomorrow on Woodw

BROTHERS

COACHES

DODGE BROTHERS

ANNOUNCE

The complete line of Trucks, Buses and Motor Coaches which Dodge Brothers have been manufacturing and selling under the name of Graham Brothers now take the name of their makers—Dodge Brothers.

These Trucks, Buses and Motor Coaches have always been powered by Dodge Brothers engines. For years they have been built of Dodge Brothers parts in Dodge Brothers plants according to Dodge Brothers standards.

These Trucks, Buses and Motor Coaches are sold, as they always have been sold, by Dodge Brothers Dealers everywhere.

For Power, Speed, Safety, Economy, Fine Appearance and Dependability, Dodge Brothers Trucks, Buses and Motor Coaches will continue to merit that high public regard which impels keen businessmen to buy them at a rate of more than a million dollars' worth a week.

DODGE BROTHERS TRUCKS

BUSES AND MOTOR COACHES

SPRAY BOOTHS *for* BUS PAINTING



ELECTRIC Railways, Steam Railways, and large Motor Bus operating companies are definitely turning to spray painting. To accommodate such large objects as Railway Coaches, Street Cars and Double Deck Buses, Spray Booths of extraordinary proportions were necessary. In meeting this demand, Mahon engineers, who have for years specialized in the scientific development of Spray Booths for every industry, are prepared to design for you a spray booth installation that will meet your most exacting requirements —a spray booth with maximum efficiency and minimum operating cost. Let these Spray Booth specialists cooperate with you in the design and arrangement of Spray Booths for your paint shop. Estimates and recommendations furnished without obligation.

Write for our latest Spray Booth pamphlet

THE R.C.MAHON COMPANY
DETROIT, MICHIGAN
Manufacturers of Spray Booths and Exhaust Stacks, Industrial Drying Ovens and Blow Pipe Systems

MAHON
SPRAY BOOTHS & EXHAUST STACKS
DESIGNED FOR FIRE SAFETY



H & K 900D Double Chair —a luxurious seat providing automotive comfort in a car and adaptable to either city or Inter-City service.

Today it's COMFORT *you are selling*



What *Is* This Thing Called "Comfort"?

Comfort wasn't expected in the days of bandbox baggage and puffed sleeves. But today it's *comfort you are selling* and traffic follows routes of comfort just as surely as a street car follows rails. Make the comfort of your transportation famous which, of course, requires a true understanding of what comfort *is*.



COMFORT, as the dictionary says, is "a state of ease and satisfaction of body" with "freedom from all pain, annoyance or want."

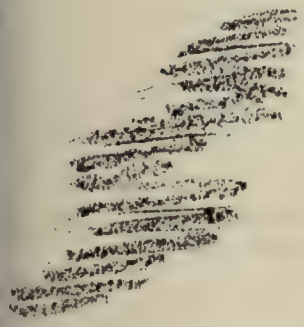
This kind of comfort in a street car requires, first of all, a seat with springs and cushions, back and arm rests designed and placed to the greatest satisfaction, ease and freedom to the body in all postures of traveling repose.

Secondly there must be freedom from all pain (such as a cramped leg position)—freedom from all annoyances (such as too close a proximity of heaters)—and freedom from all want (such as the need for better light).

To meet these modern requisites of comfort there must be not only perfect seat design but perfect seat arrangement with respect to spacing, windows, heat and lights. All these factors must combine to form *one* harmonious and comfortable whole.

HALE & KILBURN SEATS

"A Better Seat for Every Type of Modern Transportation Service"



There can be no unity of comfort in a car unless such unity is planned in advance. An office that is comfortable to work in must be laid out *around* the desks and chairs it is to accommodate and the same applies to the seating in a car. Hale & Kilburn Seating Engineers can always provide the most comfortable seating that it is possible to arrange at the time they are called. But the greatest possible unity of comfort can be obtained only when these engineers are summoned in advance—while the car is still on paper or, better yet, while it is still merely a project in mind.

HALE & KILBURN COMPANY

General Offices and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
T. C. Coleman & Son, Starks Bldg., Louisville
W. L. Jefferies, Jr., Mutual Bldg., Richmond
C. S. Wright Co., 66 Temperance St., Toronto, Ont., Canada
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
W. M. Euler, 146 N. Sixth St., Portland, Oregon

ALUMINUM BUSBAR

A writer in "The Electrician" (of London) discusses the advantages of aluminum busbar, and introduces his subject by asking a question:—

> **"What capital have I invested in conductors, and to what extent am I adding to this investment annually?" The answers to these questions should be known to all engaged in the generation and distribution of electrical energy, because the sums involved are often surprisingly large, and the promise of a considerable reduction in this investment will itself justify the closest investigation into the claims of aluminum as a material.**
>
> **"There is no better example of the usefulness of aluminum than as the material for heavy current busbars . . ."**

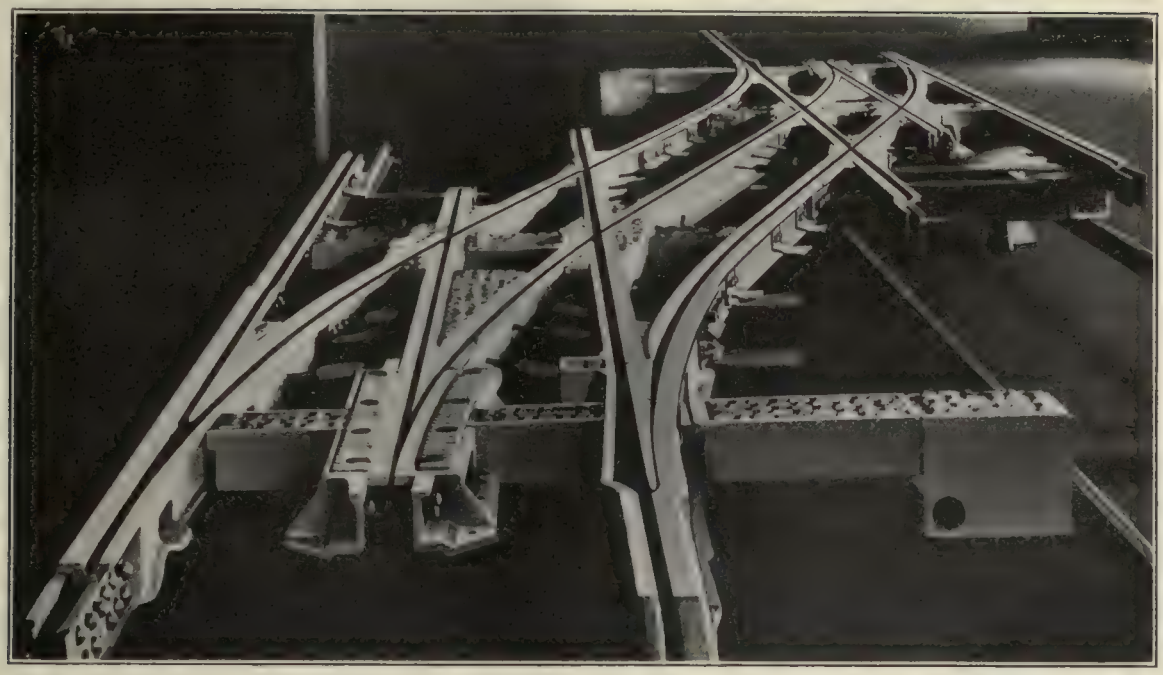
Among those who bought aluminum busbar in 1928, we list the following:

American Brown-Boveri Electric Corp.
American Manufacturing Co.
American Rolling Mills Co.
Appalachian Elec. Power Co.
John W. Brown Mfg. Co.
Chevrolet Motor Co. of Michigan
Chicago Electric Mfg. Co.
Cincinnati Street Railway Co.
Hohman Plating Company
Hooker Electrochemical Co.
Illinois Public Utility Co.
Lower Peninsula Power Co.
Powerlite Switchboard Co.
Stolle Steel & Iron Co.
Vanadium Corp. of America

The booklet "Aluminum Busbars", free on request, contains useful tables of weights, carrying capacities, and physical properties, with photographs of installations. Please send for your copy.

ALUMINUM COMPANY OF AMERICA

2400 Oliver Building Pittsburgh, Penna.



Where traffic is HEAVIEST OVER FROGS, SWITCHES, CROSSOVERS, CROSSINGS YOU NEED

TISCO TRACKWORK

TISCO
MANGANESE STEEL
—The Original in the Trackwork Field—gives super-enduring qualities to frogs, switches, crossovers and other special trackwork.

By keeping abreast of the constantly increasing demands of the time, Wharton Trackwork has successfully withstood the severest tests of service to which it has been subjected for a period of almost 70 years.

* * * *

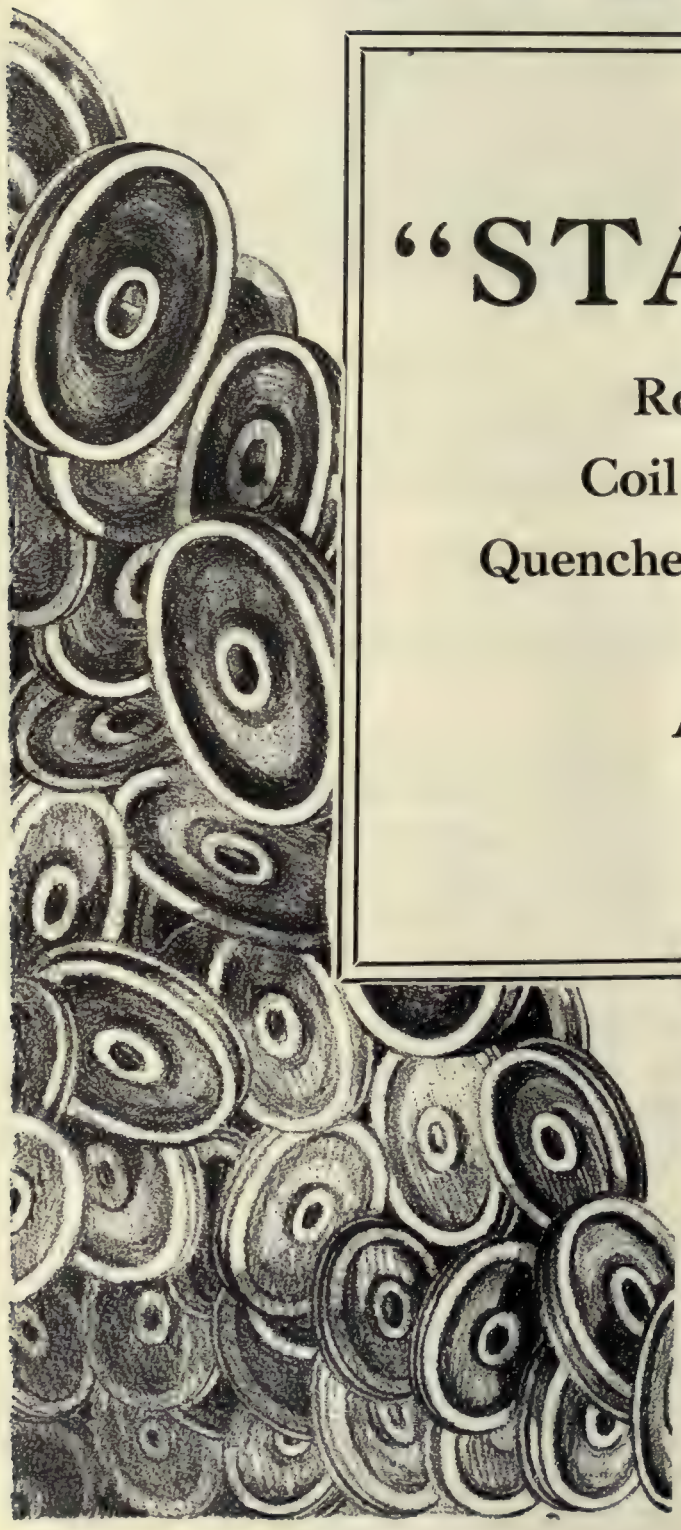
We furnish Trackwork of Chrome Nickel Construction, when this type of work is desired.

* * * *

Our Engineers will be pleased to go over any trackwork problems about which you may care to consult us.

WM. WHARTON JR. & CO., Inc.
EASTON, PA.

s t a r t t h



"STANDARD"

Rolled Steel Wheels

Coil and Elliptic Springs

Quenched and Tempered Carbon

Steel Axles

Armature Shafts

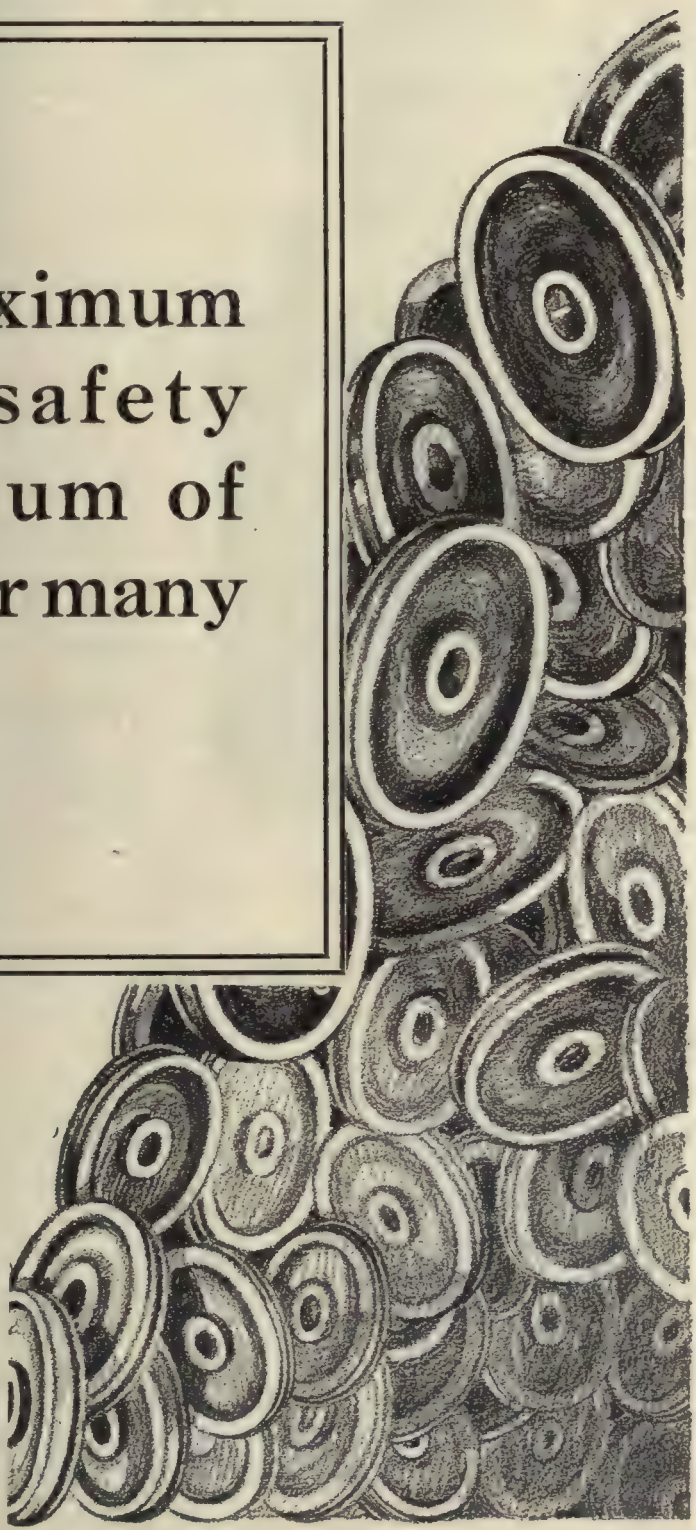
STANDARD STE

Branch Offices:

CHICAGO — ST. LOUIS
NEW YORK — HOUSTON
RICHMOND — PORTLAND
PITTSBURGH — SAN FRANCIS

ear with:

—and enjoy maximum service and safety with a minimum of maintenance for many years to come.

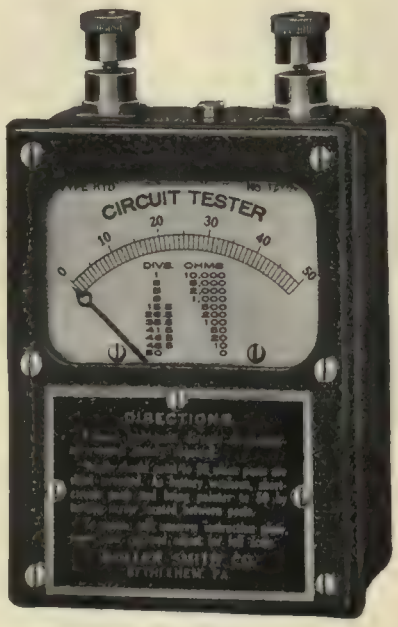


RKS COMPANY
ladelphia, Pa.
ks: Burnham, Pa.

ROLLER-SMITH
TYPE HTD CIRCUIT TESTER

"Just what we have been looking for"





"It's the handiest tester I've ever seen for locating open circuits and measuring resistances"

Here is an instrument built to meet the growing demand for a small, lightweight inexpensive tester in railway repair shops, out on the line, in substations, etc.

For a compact, rugged and thoroughly dependable tester you will find the HTD Circuit Tester unexcelled. With it one can instantly locate open circuits in coils and circuits of all kinds. Not only that but it shows *directly* the approximate resistance of the coil or circuit up to a range of 10,000 ohms. Bulletin No. G-300 describes it.

Bulletin G-300 describes also the ROLLER-SMITH Type COM Ohmmeter which is portable, accurate and self-contained. Write for these bulletins.

ROLLER-SMITH Bond Testers are known and used all over the world. The Type SBT is recommended for all ordinary work and the super-sensitive Type BBT for conditions where there is little or no current in the rail. Bulletin G-200 should be in the hands of every man who is interested in bond testing.



ROLLER-SMITH COMPANY
Electrical Measuring and Protective Apparatus

MAIN OFFICE
2140 Woolworth Bldg., New York

WORKS
Bethlehem, Penna.

Offices in principal cities in U. S. A. and Canada.
Representatives in Australia, Cuba and Japan.

Over 30 years' experience is back of ROLLER-SMITH

Now you can be sure *of*

TIRE MILEAGE



from the tires that you buy

NO MATTER what industry you are engaged in . . . no matter what section or sections of the country your trucks or buses must operate in . . . no matter over what kind of roads they must travel . . . Goodrich truck and bus tires will answer your tire operating problems *better* than any other tires that you can buy. The past experience of thousands of fleet operators in all industries definitely prove it.

Specify Goodrich when you purchase your next truck. Then you will get the *right* tire for the load and the road.

THE B. F. GOODRICH RUBBER COMPANY · Akron, Ohio · *Established 1870*

Pacific Goodrich Co., Los Angeles, Cal. **In Canada: Canadian Goodrich Co., Kitchener, Ont.**

FOR TRUCKS

have just removed from one of our trucks 32 x 6 Goodrich Heavy Duty Silvertown ng that has gone 49,102 miles. As this truck ed in very hard service we think that this eptionally good service."

WILFONG CARTAGE COMPANY
Contractors, Youngstown, Ohio

BUSES

"We had 33 x 675 Goodrich Silvertowns on one of our Nash buses on our line weighing 5800 pounds. To date these tires have covered 51,262 miles during a period of eight months."

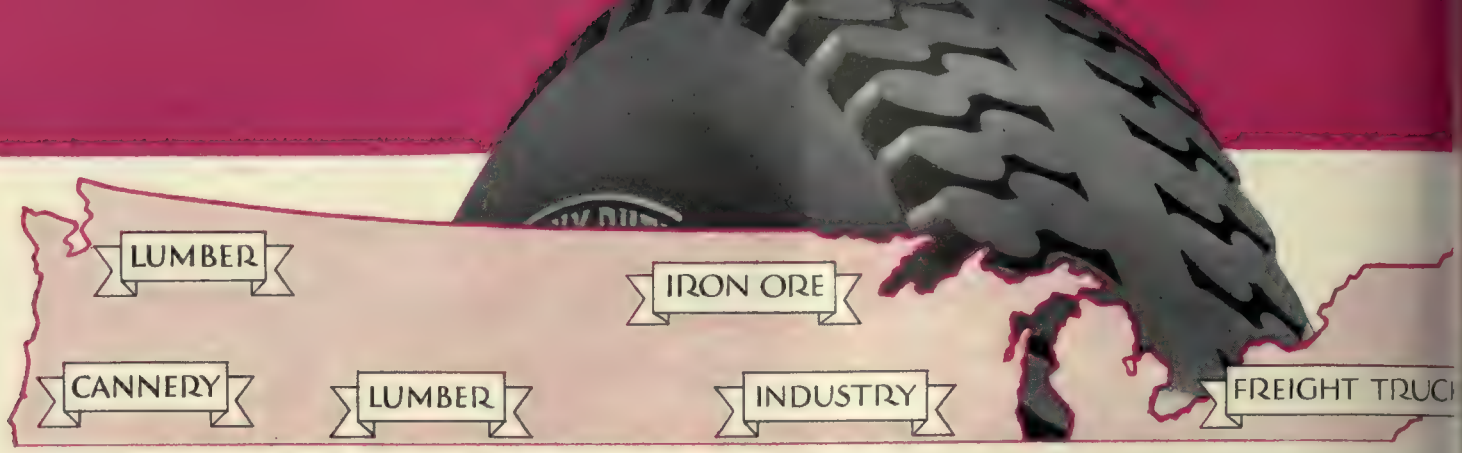
NASH BUS LINES
Bus Transportation, Wilson, N. C.

AND TRAILERS

"We have two new Semi-Trailer Reo Trucks on 34 x 7 Goodrich Heavy Duty Silvertown on both trucks and trailers, hauling 4000 feet of green lumber to the load. These tires have rolled over 21,000 miles under these heavy loads with very little interruption from tire trouble."

BEARDMORE TRANSFER LINE
Warehousing and Distributing, Spokane, Wash.

HEAVY DUTY Goodrich Silvertowns



FROM INDUSTRIES ALL OVER THE UNITED STATES COME STATEMENTS LIKE THESE ABOUT GOODRICH HEAVY DUTY SILVERTOWNS



"The Bull-Dog Mack on the 40 x 8 Goodrich Heavy Duty Silvertowns has passed the 40,000 mile mark before the first tire was taken out of service and the treads are still good for many thousand miles more."

S. & S. Auto Freight
Redmond, Washington.

"It gives me a great deal of pleasure at this time to inform you of the remarkable service we have had with a set of your 36 x 6 truck tires. These tires have been in daily service on one of our 1000 gallon tank trucks for three years."

K. B. K. Service Stations, *Inc.*
Glendale, California.

"We have been using Goodrich Silvertown Heavy Dutys on our school buses for the past two years. Our cost per bus mile was among the lowest of the state last year—and we feel that a great part of this was due to the excellent trouble-free mileage delivered by your Heavy Duty Tires."

Wilson County Garage
Wilson, N. C.

"The hundreds of thousands of miles on Goodrich Heavy Duty Silvertown tires, have proven to me the value of uninterrupted service."

M. Sinclair, *Trucking Contractor,*
Spokane, Washington.

"I am operating a freight line over both pavement and gravel roads. I now have in service 36 x 8 and 40 x 8 Heavy Duty Silvertowns which have an average mileage to date of approximately 45,000 miles. These tires are still in constant service hauling heavy freight loads. Four tires on the first truck equipped with pneumatics have gone over 60,000 miles and are still in service at this time on a four wheel trailer."

Red Ball Motor Freight
Chehalis, Washington

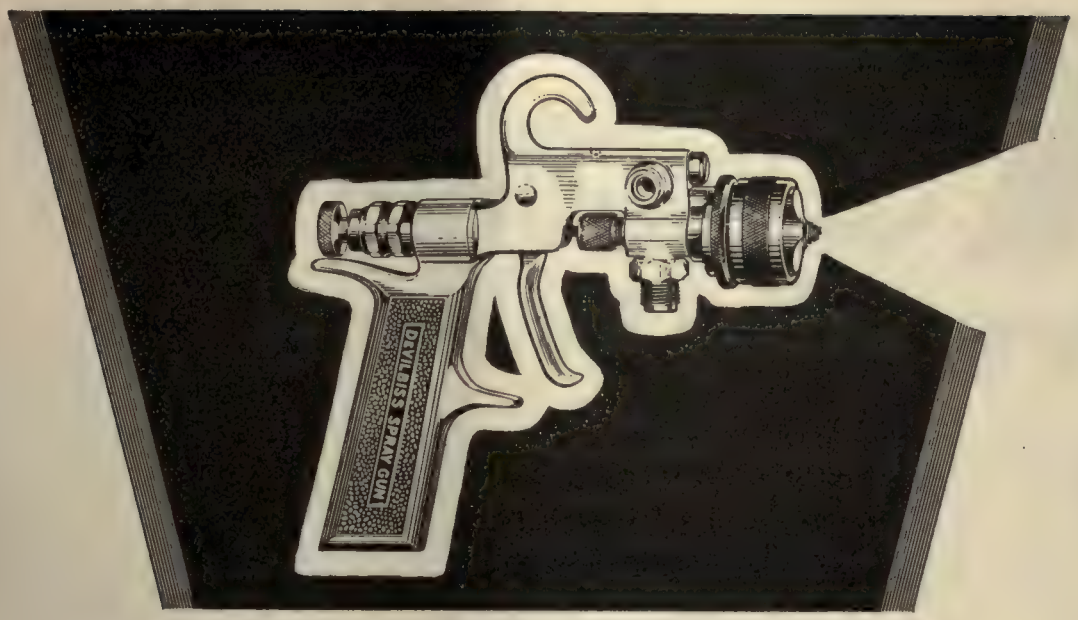
Now *you* can be sure of tire mileage. Be *sure* to specify Goodrich Silvertowns when you buy your next truck.

THE B. F. GOODRICH RUBBER COMPANY · Akron, Ohio · *Est. 1870*

Pacific Goodrich Rubber Co., Los Angeles, Cal. In Canada: Canadian Goodrich Co., Kitchener, Ont.

HEAVY DUTY

Goodrich Silvertowns



The LEADERSHIP *that builds confidence in a product*

THERE is no element of speculation in the purchase of DeVilbiss Spray-Painting Equipment for use in the electric railway field. The recognition of this fact enabled many electric railway operators to take advantage of the new, faster, more economical and better spray system method of maintenance than otherwise would have obtained.

The certainty of results accomplished by DeVilbiss Systems among other and older users, and the positive manner in which DeVilbiss has met the specialized needs of electric railway maintenance factors, have greatly speeded the adoption of the spray system by them and enabled the electric railways to keep pace with other transport organizations in modernized appearance and reduced maintenance costs.

We will gladly put our large knowledge of spray-painting in the electric railway field at your disposal, and aid you in the selection of DeVilbiss specialized equipment exactly suited to your task.

THE DEVILBISS COMPANY · 272 PHILLIPS AVENUE · TOLEDO, OHIO

Sales and Service Branches:
NEW YORK
CHICAGO
PHILADELPHIA
ST. LOUIS
CLEVELAND

DeVilbiss Spray-PAINTING FINISHING System

Sales and Service Branches:
SAN FRANCISCO
DETROIT
INDIANAPOLIS
WINDSOR ONTARIO

DIRECT FACTORY REPRESENTATIVES

DOES THE WORK OF FIVE MEN

IN ALL OTHER TERRITORIES

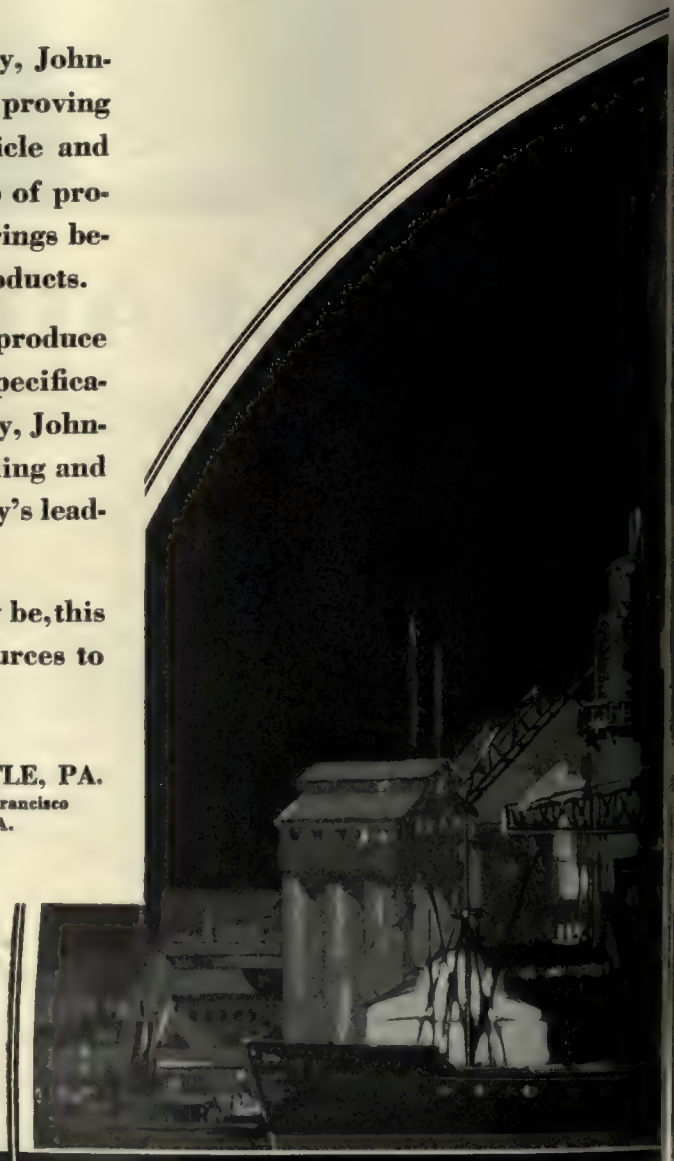
A Servant of all a Specialist for many

YEAR after year, for a quarter-century, Johnson Bronze has had the privilege of proving to an increasingly large number of vehicle and machinery builders and users that the job of producing finished bronze bushings and bearings belongs to the specialized maker of such products.

Equipped both mentally and physically to produce these important bronze parts to exacting specifications, not just on occasion but continuously, Johnson Bronze now serves as the bronze bushing and bearing department of many of the country's leading industrial manufacturers.

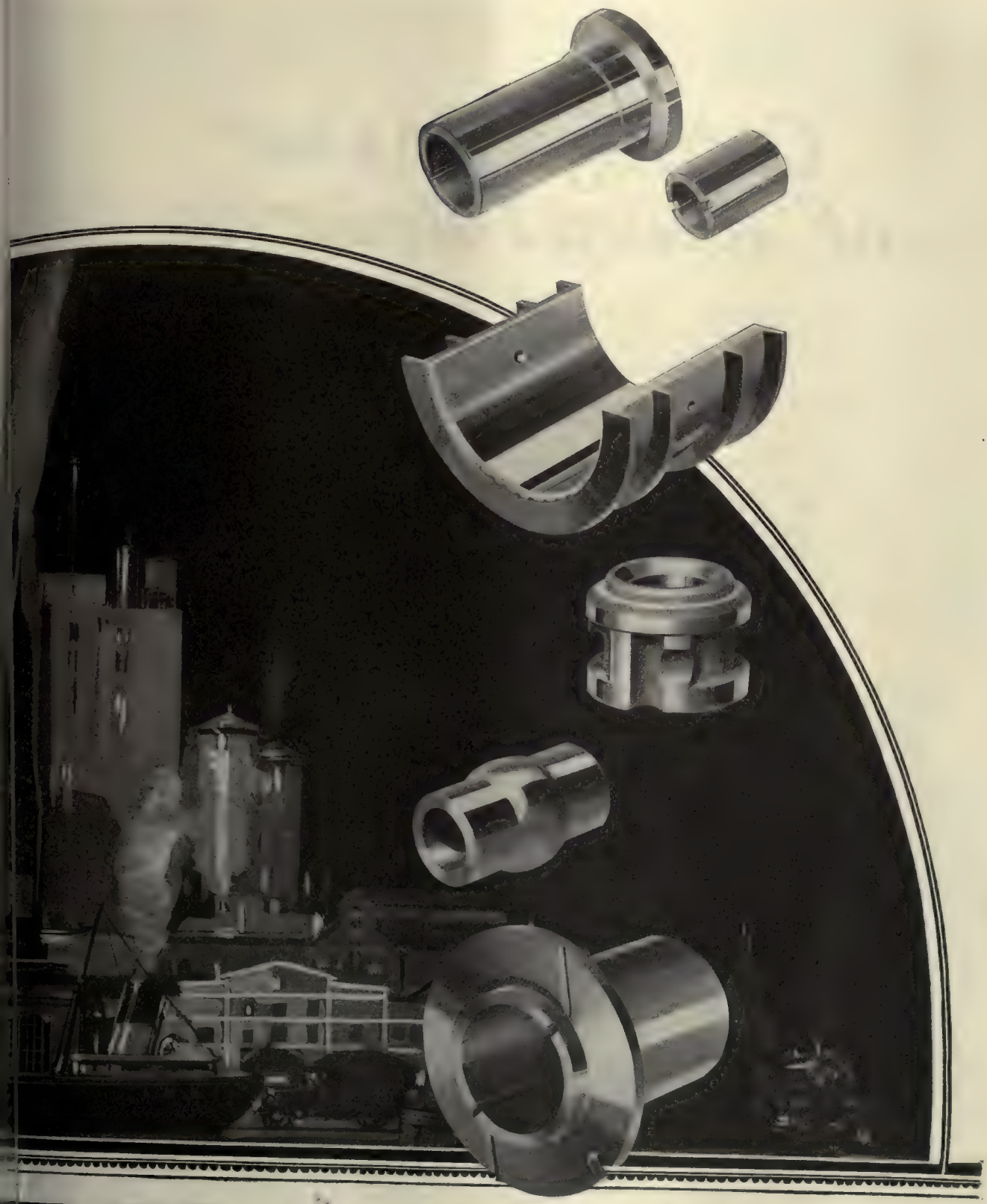
Whatever the bronze bearing problem may be, this organization has the experience and resources to solve it efficiently and economically.

JOHNSON BRONZE COMPANY, NEW CASTLE, PA.
New York, Chicago, Detroit, Cleveland, Kansas City, San Francisco
Export Address: 130 W. 42nd St., New York City, U. S. A.
Cable JONBRON



JOHNSON

BUSHINGS BAR



BRONZE

RONZE BEARINGS

Cutting the Cost of Trolley Pole Service

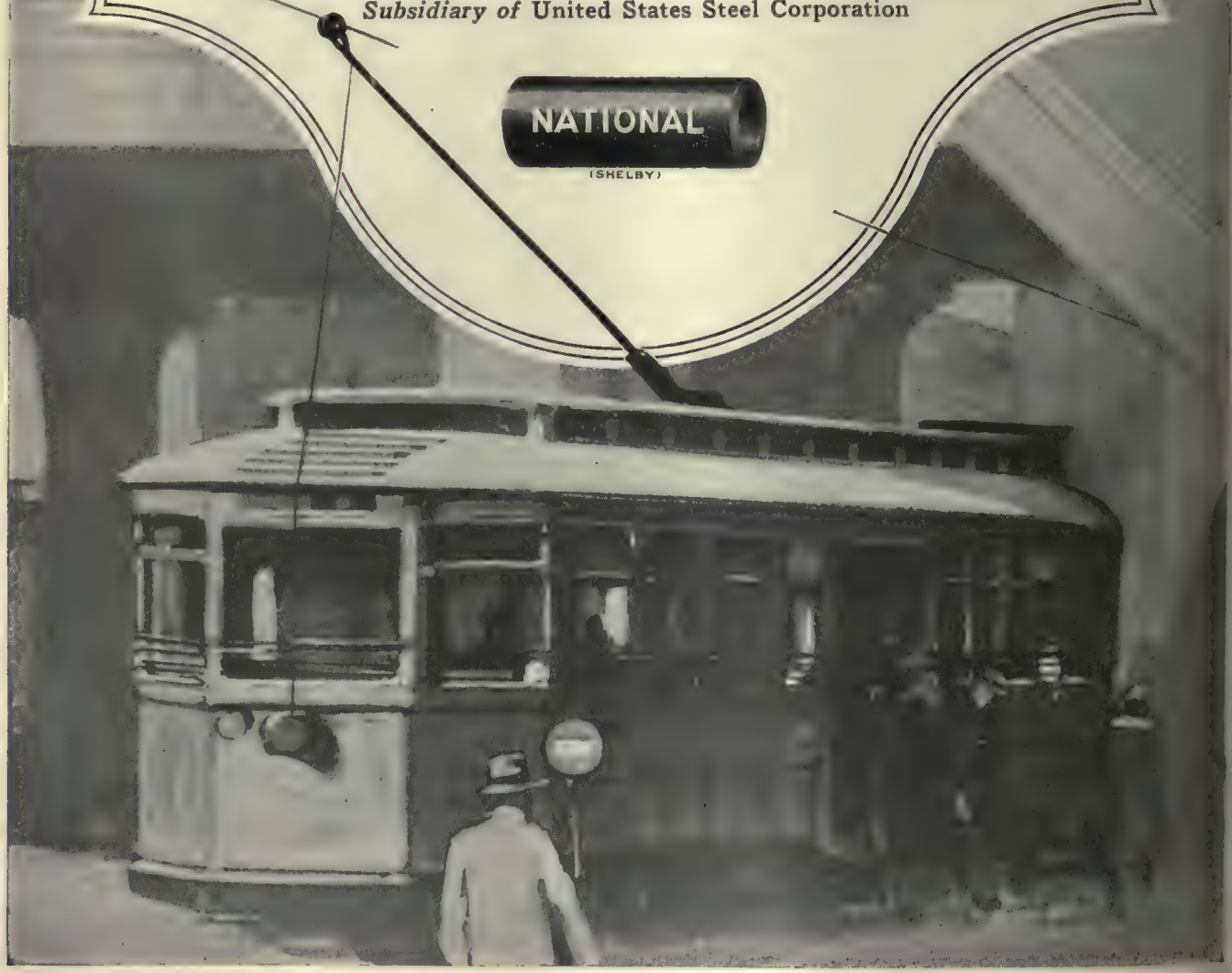
THE actual cost of trolley pole service is not confined to the purchase price of the pole itself. What the pole can do from day to day to keep down delays, avoid traffic tie-ups and eliminate frequent repairs or replacement of poles—are factors that determine the ultimate cost of trolley pole service.

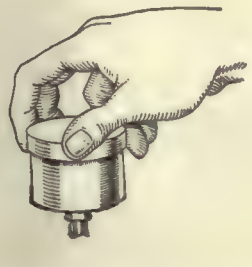
"NATIONAL-SHELBY" Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service. In addition, every "NATIONAL-SHELBY" Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

Subsidiary of United States Steel Corporation

NATIONAL (SHELBY)





Pressure Lubrication Involves more than this Now-a-days!

Pressure lubrication, in the old days, meant giving a few turns to the caps of the grease cups—and trusting that the lubricant would get to the spot required.

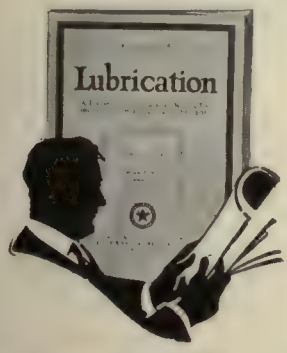
Now-a-days, with speeds and pressure far different than what they used to be, more positive means of oil or grease application are required.

Consequently, industry has turned extensively to mechanical pressure lubrication.

With this change, the human element in regulating lubricating pressures has been largely eliminated; but the necessity for alertness in the *kind* and *amount* of lubricant to use has been increased.

We speak with authority on this subject. We have studied it extensively; and much of our information is the result of actual experience on machinery within our own plants and throughout plants of thousands of satisfied TEXACO customers.

We can furnish you a time-tested TEXACO Lubricant that will work most effectively and economically on any system of pressure lubrication you are using.



The December 1928 issue of the magazine, "LUBRICATION;" is devoted entirely to the subject of Pressure Lubrication. We shall be glad to send you a copy and put you on the free mailing list to receive "LUBRICATION" monthly. Write to the address below.

TEXACO

THE TEXAS COMPANY

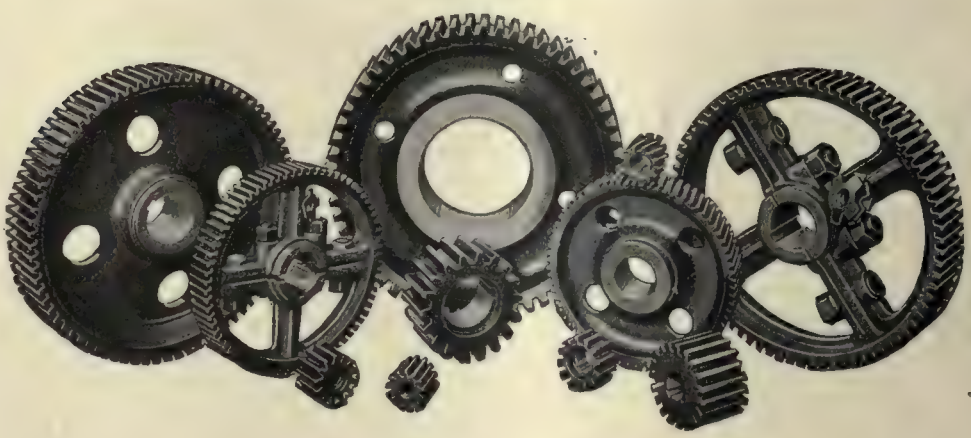
Texaco Petroleum Products

Dept. E1, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES

TEXACO

"Tool Steel" speaks gear economy in any language



「ツール、スチール」

ツール、スチール製品は科學的に充分熱化せるものにて(圖解參照)文字通りツールスチールを帶びたるものなり。

ツール、スチール製品は凡て特別熱化法を施したるものにて、あらゆる用途に於て普通品の五倍の使用に耐ゆることを實際的に保証す。

小ツール、ステール、ギーア。ピニオン(小齒車)又はスプロッケット等を見本的に注文して先づ弊品を嚴密に試驗されたし。

而して滿足なる耐久的用途に注意されよ記臆されよ——ツール、スチールは普通品の五倍の耐久力を保証されたものであることを。

三井物產會社が弊社代理店であります。

北米華州シアトル市

シー、エム、ラヴステッド商會



OUR advertisements and salesmen must speak many languages for "Tool Steel" Gears and Pinions are in daily use in all corners of the globe.

The advertisement above, was taken from a dealer's booklet with Japanese circulation. However from the standpoint of economy "Tool Steel" Gears and Pinions speak a universal language.

The Tool Steel Gear & Pinion Co.

Cincinnati, Ohio



Another Step in the Journey that Leads to *Multiplied Mileage*

Having passed from wheel block yard to forging press, from hub punch to rolling mill, and from coning press to first inspection, the Gary Wrought Steel Wheel comes now to the *machining operation.*

Here equipment of surpassing efficiency machines the tread and flange, faces and rough-bores the hub, and gives a clean, workmanlike appearance to the product. Alert and sharp-eyed men subject each wheel to a painstaking examination before passing it on to the final inspection.

Each step in the journey from wheel block to shipping dock is definite and carefully planned to put into these wheels the safety, economy and long life with which the name "Gary" is synonymous.

Our wheel engineers are ready to co-operate with you in solving your wheel problems.

Illinois Steel Company
Subsidiary United States Steel Corporation
General Offices: 208 So. La Salle Street
Chicago, Illinois

G A R Y
WROUGHT STEEL WHEELS

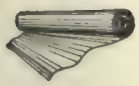
62 GUARDIANS
of electrical performance

1. Air Brake Motor Insulation
2. Armatite — Fish Paper and Varnished Cambric Combined
3. Armature Slot Insulation
4. Armature Twine
5. Armco Paper
6. Bushings—Micanite
7. Cable Joint Insulation
8. Commutator Insulation
9. Discs—Raw Mica

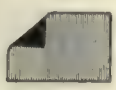


10. Duck-Oiled and Varnished
11. Empire Oiled Cloth; Paper
12. Empire Oiled Tubing
13. Fibre—Untreated
14. Filling Compound
15. Fish Paper—Untreated
16. Flexible Micanite
17. Glue
18. Heating Unit Insulation
19. Horn Fibre





20. Kablak; Black Varnished Cloth and Paper
21. Linolac (Amber Varnish)
22. Linotape (Oiled Tape)
23. Micoid Paper—Black
24. M. I. C. Compound (Black Varnish)
25. Moulding Micanite
26. Oiled Tubing
27. Oiled Tape
28. Paper and Mica
29. Paper - Oiled and Varnished
30. Paper—Red Rope



31. Pressboard—Untreated
32. Railway Motor Insulation.
33. Raw Mica—Cut to Pattern
34. Rings for Commutators
35. Rope Paper—Oiled
36. Segments—Micanite
37. Shellac Varnish
38. Silk—Oiled
39. Silk Tape
40. Sleeving—Varnished
41. Sleeving—Cotton

42. Soldering Paste
43. Splicing Compound
44. Stay Binding
45. Surgical Webbing
46. Tape for Armature Coils
47. Tape—Friction
48. Tape—Mica
49. Tape—Rubber
50. Tape — Untreated Cotton Silk
51. Transformer Insulation
52. Tubing—Mica



53. Tubing—Oiled or Varnished
54. Twine—Armature
55. Varnishes
56. Varnished Cloths
57. Washers—Built-Up Mica
58. Washers—Micanite
59. Washers—Raw Mica
60. Webbing
61. X-Ray Terminal Insulation
62. Empire Seamless Bias Tape



DIRECTING electrical traffic —guiding current along its predetermined path of usefulness in electrical equipment of every description—that is the mission of the 62.

Ever since the pioneer days, Mica Insulator Company has kept abreast of the demands for better and better insulation for the generation, transmission and utilization of electrical energy.

"Micanite," the original pasted mica insulation, and "Empire" treated cloth insulations are outstanding examples of the contributions which the Mica Insulator Company has made to the art of electrical insulation. Every one of the 62 products provides a means of assuring better, more dependable electrical equipment.

MICA INSULATOR COMPANY

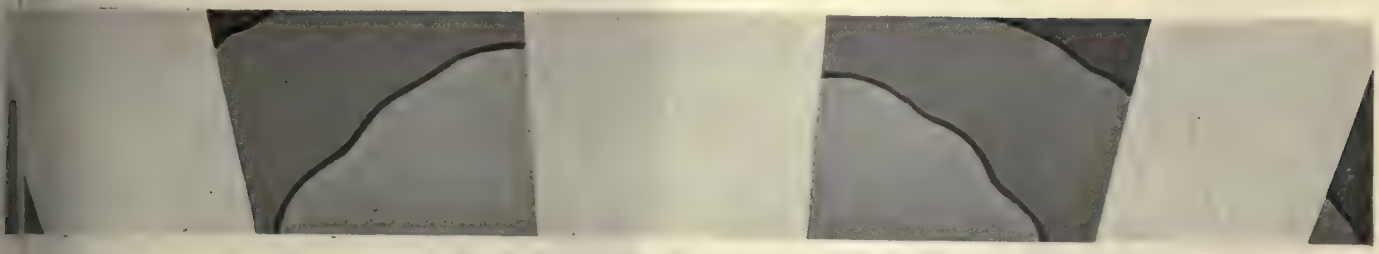
New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Cleveland Pittsburgh Cincinnati San Francisco
Los Angeles Seattle Montreal Toronto
Works: Schenectady, N. Y. London, England

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF.

MICA INSULATION OILED CLOTH INSULATION





The Car Upholstered in Velmo Mohair invites and holds Patronage

CHASE

Velmo

Made by SANFORD MILLS, Sanford, Maine
Selling Agents, L. C. CHASE & Co., BOSTON
New York · Detroit · Chicago · San Francisco





For Substation Control

The trend today is toward saving in power costs as well as toward better power distribution throughout the system as a whole.

The automatic substation represents one solution to this problem, and with it goes the need for dependable time switches.

Anderson Automatic Time Switches

fulfill the necessary requirements of electric railway operation where the time element enters into the control of circuits; they are supplied in different capacities and up to 6600 volts.

The whole time switch, including the time piece, is constructed in our own factory; the clock which is the heart of the time switch, is built for the switch and the switch is built for the clock. Dependability has been well proved by the fact that many Andersons are still running smoothly and successfully after more than twenty years of service.

Different attachments can be inserted in the standard types of hand or electrically wound time switches which increases their field of usefulness. Various other types of time switches are made to suit the specific and particular requirements of electric railway and other industries.

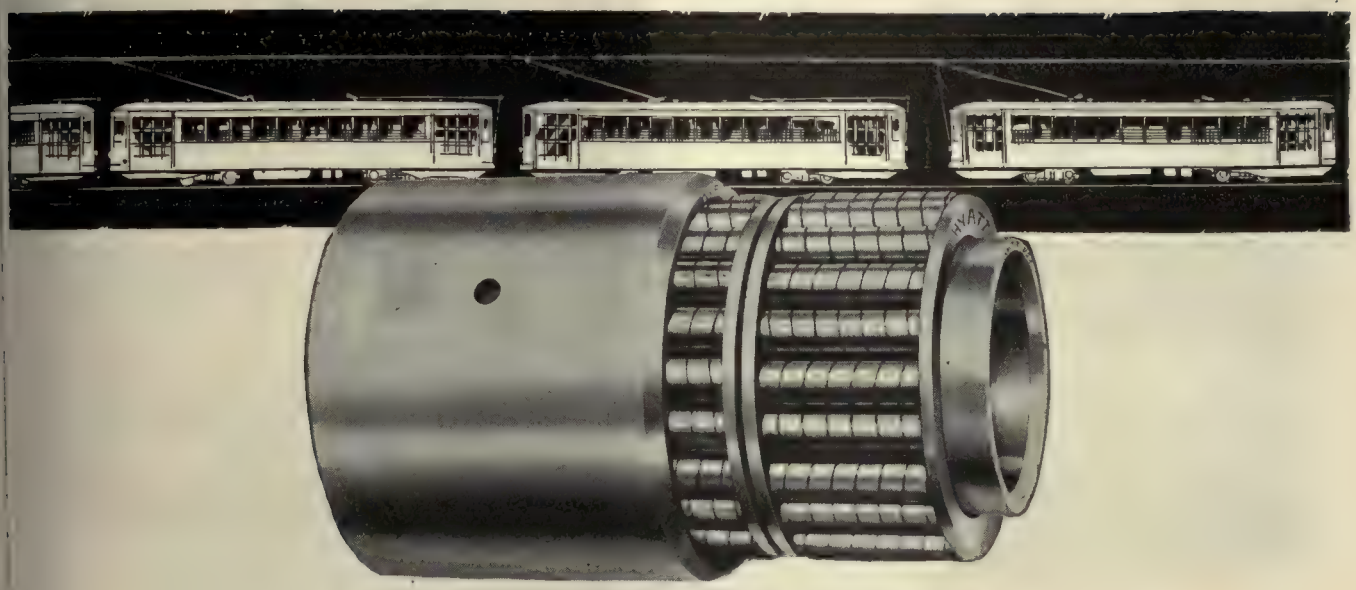
Write for Bulletin No. 37

And don't forget that Anderson also makes overhead line material—suspensions, ears, crossings, insulators, splicers, wheels and railway knife and sectionalizing switches. Write for Bulletin No. 39 on overhead material.

Albert & J. M. Anderson Manufacturing Co.

289-305 A Street, Boston, Mass.

New York Chicago Philadelphia London



Railways are becoming HYATTWAYS



The Hyatt Roller Bearing Journal Box for Railway service—sectioned to show construction.

MANY leading properties are now experiencing the operating economies and better riding qualities made possible by Hyatt Roller Bearing Journal Boxes.

One middle western city alone will shortly have nearly two hundred Hyatt equipped cars in service.

With friction-free Hyatts replacing plain brass journals, there is no more jerking and jolting due to the "grabbing" of sluggish plain bearings. Just smooth, quiet, comfortable riding . . . all contributing factors to punctual service, public good will, and, therefore, increased patronage.

Hyatt Roller Bearing Journal Boxes cut power consumption appreciably aud eliminate the costly maintenance of brass bearing journals. They help keep the cars busy earning profits instead of wasting time in repair shops.

And in addition, Hyatt Roller Bearing Journal Boxes meet every A. E. R. A. requirement for standard equipment or replacement. Ask us about the Hyattized equipment now in service or any other information you desire.

HYATT ROLLER BEARING COMPANY

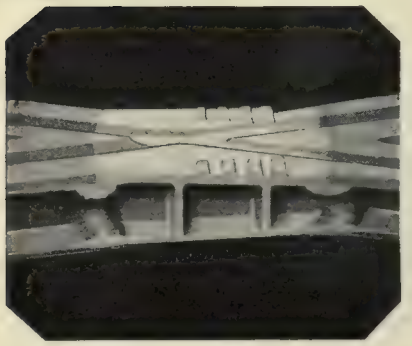
Newark Detroit Chicago Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

WELDABLE!



SILICO-MANGANESE

The New Alloy Steel for Special Trackwork





THE shock- and wear-resisting properties of silico-manganese steel are well established. This material has already been accepted as standard for highest grade automobile springs and other parts subject to shock and wear, as well as for high grade tools such as punches, chisels, shear blades, etc.

In the manufacture of special trackwork, Bethlehem uses silico-manganese steel of tool steel quality, that is hard enough to resist wear, yet sufficiently tough to withstand violent shocks and pounding. In addition the silico-manganese steel castings can be readily thermit-welded, in our shop, to rolled rails, making possible a new special trackwork design of one-piece construction.

Features

One-Piece Construction
Tough, Wear-Resisting
Readily Repaired by Welding on the Job
Can Be Thermit- or Electric-Welded to Connecting Track
Long Life
Reasonable Cost

Bethlehem Welded Special Trackwork—called Design No. 999—combines solid, one-piece construction with virtually all the desirable features of the best previously-used forms. In addition it has the decided advantage of being easily repaired by welding. This new welded special work is recommended for your 1929 requirements.

BETHLEHEM STEEL COMPANY, *General Offices:* **Bethlehem, Pa.**

District Offices

New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, Honolulu

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

Selected on a basis *of cost per mile*

Car wheels made by a combined forging and rolling process.



In selecting car wheels, it stands to reason that the true basis of comparison is cost per mile. More and more, railway executives who purchase wheels in this way are selecting the Bethlehem Wrought Steel Wheel, because of the many miles of service of which it is capable.

Strength, endurance, and wearing qualities are worked into Bethlehem Wrought Steel Wheels during the process of manufacture. Five distinct forging and rolling operations are required to make a Bethlehem Wheel. The forging gives the steel toughness, while the rolling improves the grain structure throughout the entire wheel, tending to prevent crystallization in the flange and tread, and virtually eliminating the possibility of breakage.

Do you purchase wheels on the basis of their cost per mile? If you do, the exceptional mileage of the Bethlehem Wheel and its long life in service make it well worth your consideration.

BETHLEHEM STEEL COMPANY

General Offices: **Bethlehem, Pa.**

District Offices:

New York Boston Philadelphia Baltimore Washington
Atlanta Pittsburgh Buffalo Cleveland Detroit
Cincinnati Chicago St. Louis San Francisco
Los Angeles Seattle Portland Honolulu

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of our Commercial Products

BETHLEHEM
WROUGHT STEEL WHEELS



Where operating conditions are unusually severe

HITENSO TROLLEY WIRE

HITENSO Trolley Wire, exclusively an Anaconda product, combines high strength with the least possible sacrifice in conductivity.

Hitenso "C" meets the strength requirements of the A.E.R.A. specifications for High Strength Bronze, and exceeds the conductivity by 15%. Hitenso "A" meets the specifications for Medium Strength Bronze and exceeds the conductivity by 15%. In terms of electrical efficiency, Hitenso "C" is 37½% better than High Strength Bronze, and Hitenso "A", 23% better than Medium Strength Bronze.

ANACONDA COPPER MINING CO.—THE AMERICAN BRASS COMPANY
Rod, Wire and Cable Products
General Offices: 25 Broadway, New York Chicago Office: 111 W. Washington St.

ANACONDA WIRE PRODUCTS

Truly—An All Purpose Pole!



General Electric Novalux Units on Elreco Poles—an orderly curb line

THE accompanying illustrations strikingly demonstrate the beauty and economy of Elreco Tubular Steel Poles.

On the right, the ugly wooden poles were, of necessity, left standing to support the trolley wires. The effect of the lamp standards is nullified.

On the left, contrast the trim beauty of Elreco Poles. Trolley, span, lighting wires, lighting units all carried by one pole. No added expense for underground service.

Elreco economy is evident. With three or four companies dividing the cost of installation and maintenance, the cost to each is materially reduced.

Let us demonstrate Elreco desirability. Truly—an all purpose pole. Write—

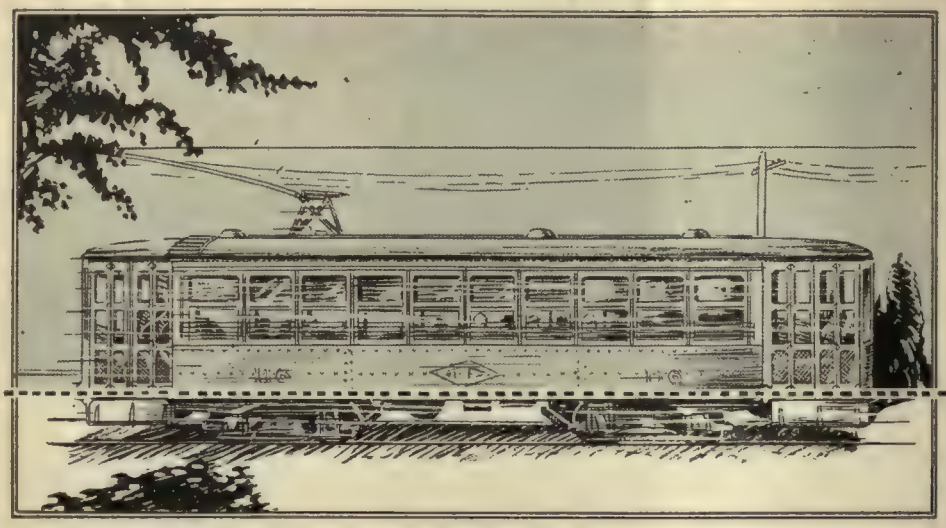
THE ELECTRIC RAILWAY EQUIPMENT CO.

2900 Cormany Ave., Cincinnati, Ohio
30 Church St., New York



A jumbled disorderly curb line caused by different kinds of poles

ELRECO
POLES



Carnegie Products will be of help in securing passenger satisfaction

Modern traffic conditions—big cars, heavy loads, accelerated starting and emergency stopping—throw an ever-increasing burden on equipment. The use of Carnegie Products will aid in bringing your equipment up to the requirements of present-day transportation. Passengers are quick to appreciate smoothly running, efficiently operated cars. Thus in modernizing you reap an important by-product in their satisfaction.

Carnegie Wrought Steel Wheels assure high resistance to the wear and tear of traffic today. They are made of a high carbon steel by a special process of rolling and forging that refines the steel, insuring a homogeneous structure, free from irregularities that might cause trouble.

Carnegie Axles. More than 60 years of experience in the manufacture of axles, coupled with every facility for correct heat treatment and accurate testing, insure the meeting of the specification in the finished product.

Carnegie Steel Cross Ties, properly laid, insure a comfortable-riding, repair-free track. Interrupted service, due to track repairs, is eliminated. The unit cost (cost per foot of track per year) is considerably lower than for wood ties.

Carnegie Rails and Rail Joints. Carnegie tee rails and splices, suitable for interurban track, are available in standard sizes and weights. Extensive manufacturing facilities permit us to serve you promptly and efficiently.

Descriptive literature on request.

CARNEGIE STEEL COMPANY

Subsidiary of UNITED STATES STEEL CORPORATION

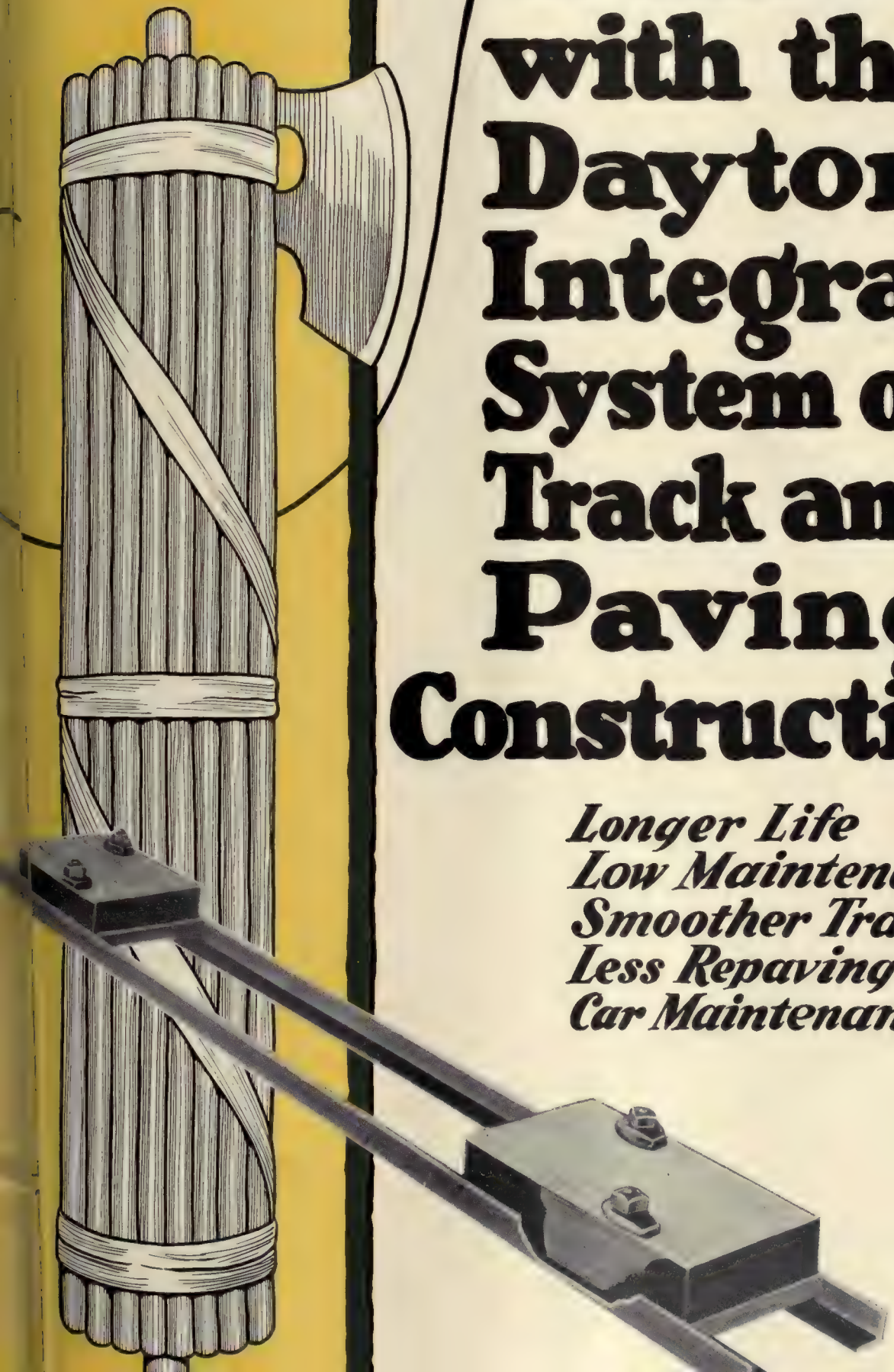
General Offices: Carnegie Building

PITTSBURGH, PA.

1947

You Can Achieve with the Dayton Integral System of Track and Paving Construction

Longer Life
Low Maintenance
Smoother Track
Less Repaving &
Car Maintenance

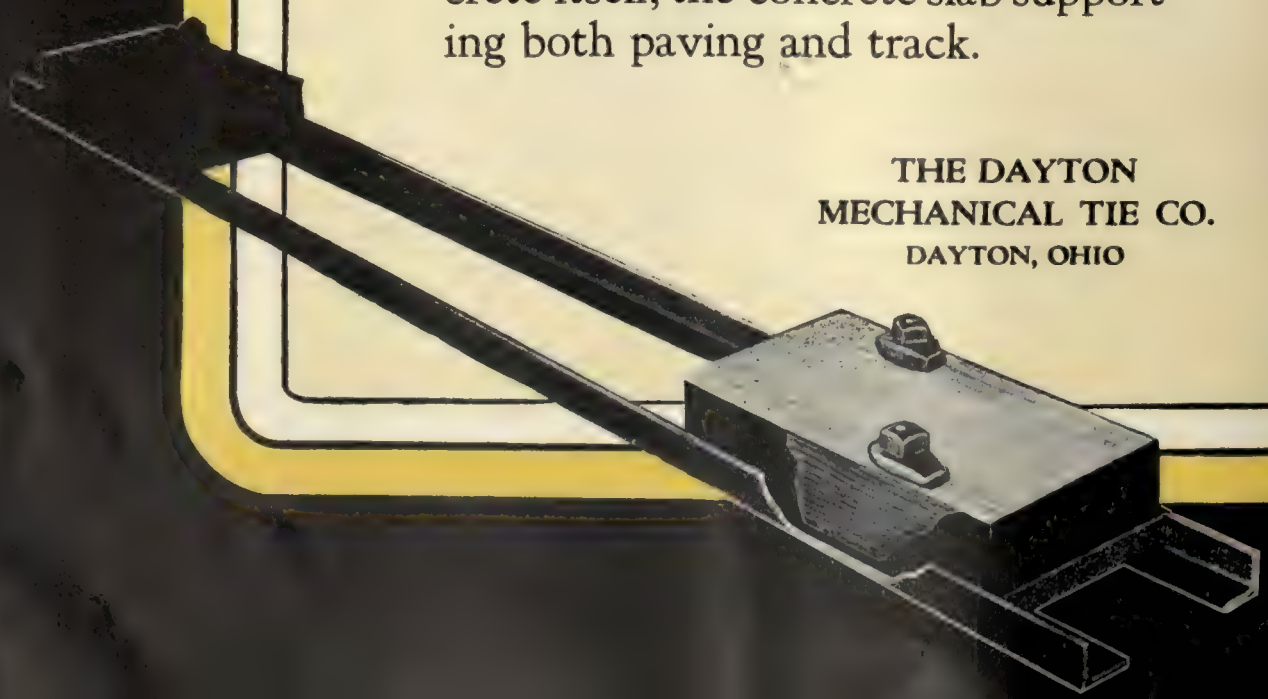


The Dayton *Integral System* of Track and Paving Construction Gives You

Just what you have been searching for all these years.

This system unifies all the elements of track and paving structure—compensates their weaknesses—brings out their strength.

The Dayton Tie is the key. It provides a cushioning member to preserve the concrete base against shocks—a re-enforcing member which is an integral part of the concrete itself, the concrete slab supporting both paving and track.



THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO

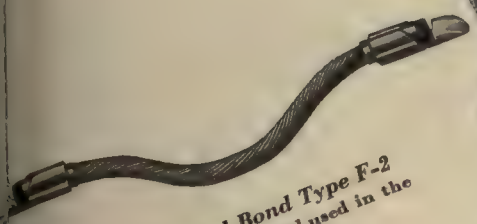
CONGRATULATIONS



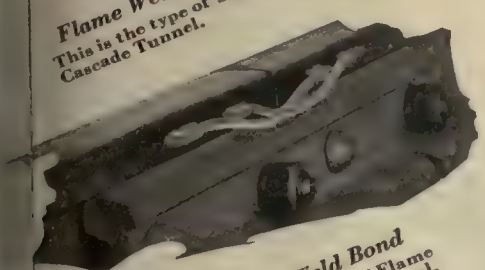
The American Steel and Wire Company wishes to tender a deserved tribute to the Great Northern Railroad and A. Guthrie and Company, contractors, on the successful completion of the Cascade Tunnel.

It was a tremendous project nobly conceived and ably executed, truly an epoch making achievement.

This Company naturally takes pride in the fact that its Flame Weld Bonds were used in the electrification of the tunnel, thus playing some part in this great forward step in transportation.



Flame Weld Signal Bond Type F-2
This is the type of Signal Bond used in the Cascade Tunnel.



Application of Flame Weld Bond
This shows the double application of Flame Weld Bonds used in the Cascade Tunnel.

American Steel & Wire Company

Subsidiary of United States Steel Corporation

208 So. LaSalle St., Chicago
30 Church St., New York
Offices in—Boston, Cleveland, Worcester, Philadelphia, Pittsburgh, Buffalo, Detroit, Cincinnati, Baltimore, Wilkes-Barre, St. Louis, Kansas City, Minneapolis-St. Paul, Oklahoma City, Birmingham, Atlanta, Memphis, Dallas, Denver, Salt Lake City.
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Export Representative: 30 Church St., New York City

COLLIER

Stimulates Traffic by



Car Card Advertising

SERVICE

Stimulating Trade!



Barron G. Collier, Inc.
CANDLER BUILDING
NEW YORK

almost everywhere!

ANOTHER APPLICATION OF **SKF** BEARINGS ON THE STREET RAILWAYS OF AMERICA FOR THE

Pittsburgh Street Railways Co.



Equipped with the highest priced bearing in the world

YOU MAY BUY A BEARING AS A BARGAIN BUT TRY AND GET A BARGAIN OUT OF USING IT

for

Nothing is apt to cost so much as a bearing that cost so little.

SKF Puts the Right Bearing in the Right Place

Mile-A-Minute Speed With Comfort and Safety Through SKF Journal Bearings on 15 New Cars

FIFTEEN new interurban cars, similar to the one shown, are included in the modernization program of the Pittsburgh Street Railways Co. and... eight **SKF** Journal Bearings are used on each car or a total of 120. The cars operate on a line 32 miles long, making the run, including stops, in one hour and twenty minutes. At times the cars reach a speed of 60 miles an hour. Each car weighs 49,500 pounds and seats 52 passengers.

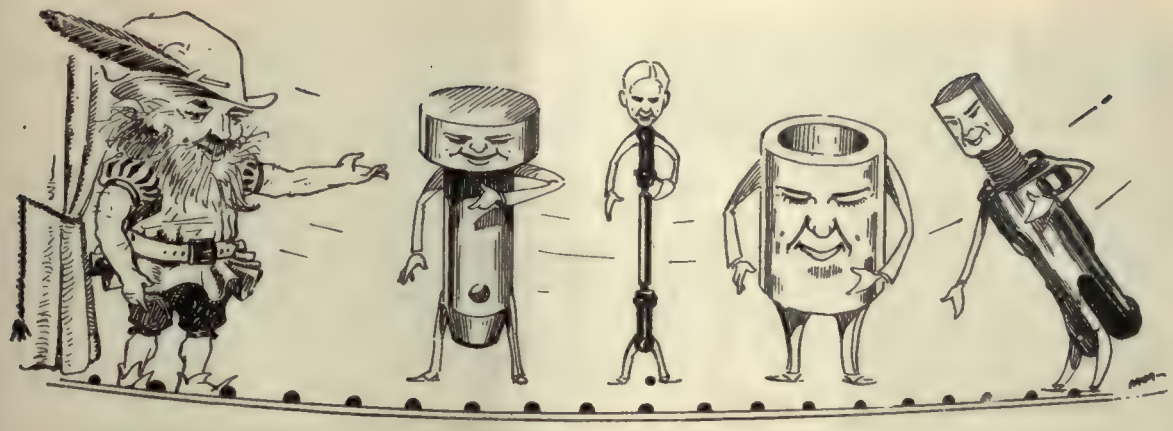
Three years' experience with **SKF** Journal Bearings has convinced this company that they are the best journal bearings on account of their self-aligning feature. In addition, they never require any adjustments, very little maintenance and insure smoother and easier riding cars. All these advantages mean a satisfied public and increased revenue for the operating company.

SKF INDUSTRIES, INC., 40 East 34th Street, New York, N.Y.

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SKF

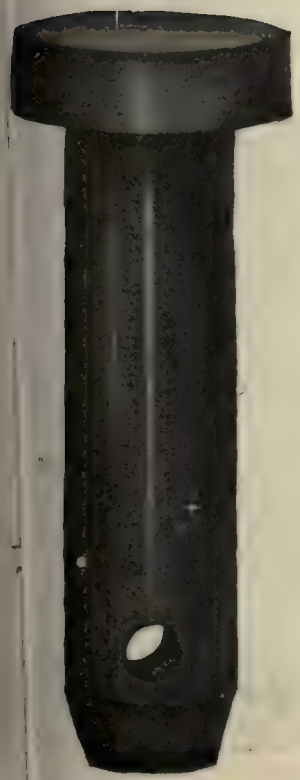
Ball and Roller Bearings



Like old friends, *they wear well—*

Our oldest friends we like the best, because they've stood the test of time, remained the same in spite of change.

Boyerized Parts, old friends of most electric railway men, are also known for their reliability and wearing qualities in face of changes in the field. For with their glass hard armor, they outlast the ordinary heat-treated parts four or five times. So naturally, they're specified again when it comes time to reorder or replace.



BOYERIZED PARTS

Spring Post Bushings	Brake Levers
Spring Posts	Pedestal Gibs
Bolster and Plates	Center Bearings
McArthur Turnbuckles	Side Bearings
Manganese Brake Heads	Case Hardened Bushings
Manganese Truck Parts	Transom Chafing
Bronze Bearings	Brake Fulcrums
Brake Pins	Forgings
Brake Hangers	Trolley Pins

BEMIS CAR TRUCK COMPANY

Electric Railway Supplies

SPRINGFIELD, MASS.

REPRESENTATIVES:

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenny, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Bldg., Los Angeles, Cal.



VIZABLEDG
PATENTED
SAFKAR
TRADE MARK REG.
SAFSTEP

Two dominating considerations point the way to your adoption of these all-steel safety steps:

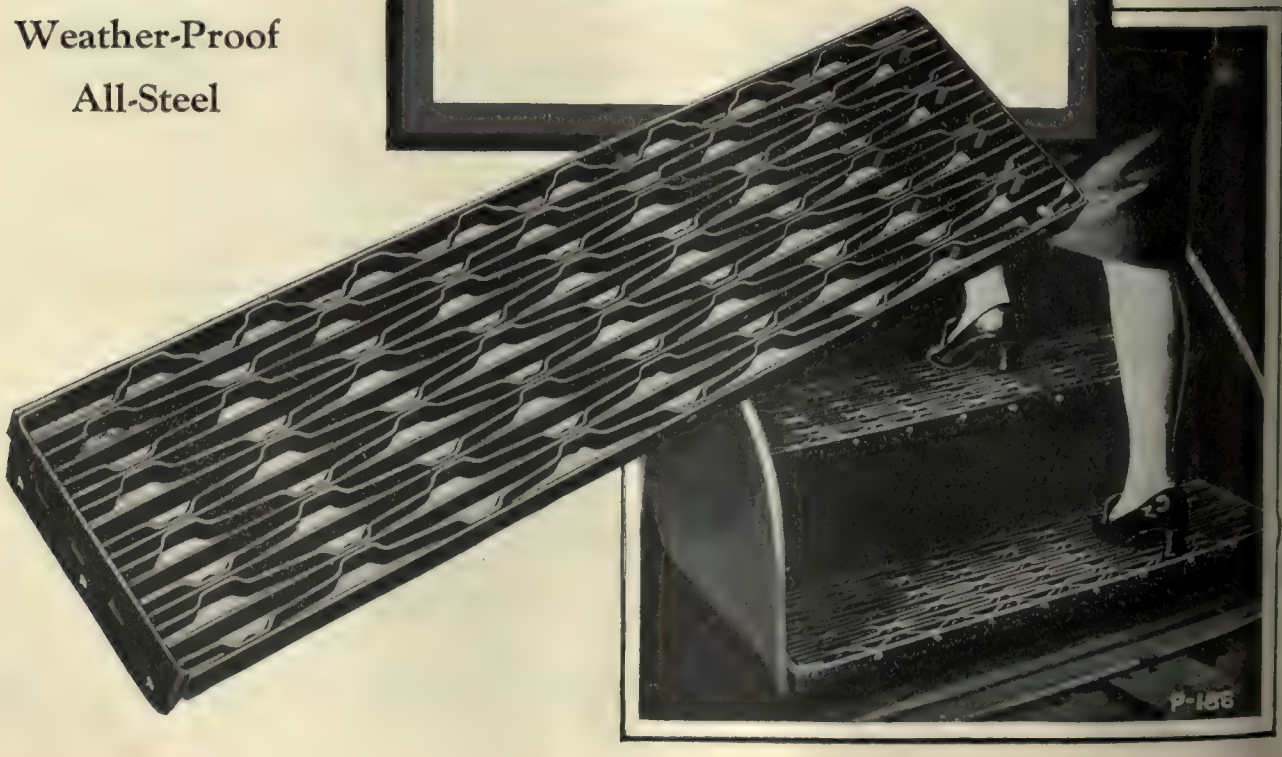
Passenger Safety against the all-too-frequent "step accidents" which may result in costly damage claims.

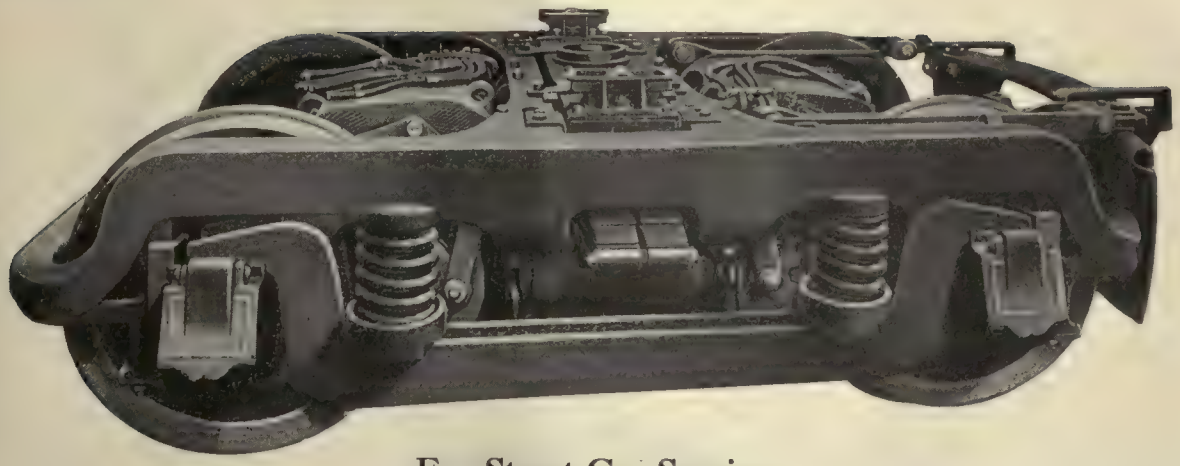
Operating Economy resulting from the elimination of all car step maintenance and a lower cost of car cleaning.

Let us send Bulletin 2D28.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y. U.S.A.
Established in 1902
SALES OFFICES IN ALL PRINCIPAL CITIES
See Your Telephone Book for Local Address

Slip-Proof
Miss-Proof
Self-Cleaning
Time-Proof
Weather-Proof
All-Steel





For Street Car Service

Commonwealth Trucks

(PATENTED)

have long enjoyed an enviable reputation throughout the railway field. The simplicity and ruggedness of their construction are the result of many years of specialized experience. The result is, maintenance and repairs are reduced to a minimum.

Commonwealth Trucks do their share and more in producing revenue year in and year out.

Designed for street railway and high-speed interurban service.

Cast steel frame, including cross and end transoms, a single strong unit.

Pedestals cast integral with frames are machined, insuring perfect alignment. Renewable hardened spring steel liners protect them from wear.

COMMONWEALTH STEEL COMPANY
Granite City, Illinois



For Interurban Service

GRIFFIN

SINGLE PLATE

WHEELS

CHILLED TREAD



CHILLED BACK FLANGE

GUARANTEED

MAXIMUM MILEAGE—LOW COST

GRIFFIN WHEEL COMPANY

410 North Michigan Ave. Chicago, Illinois

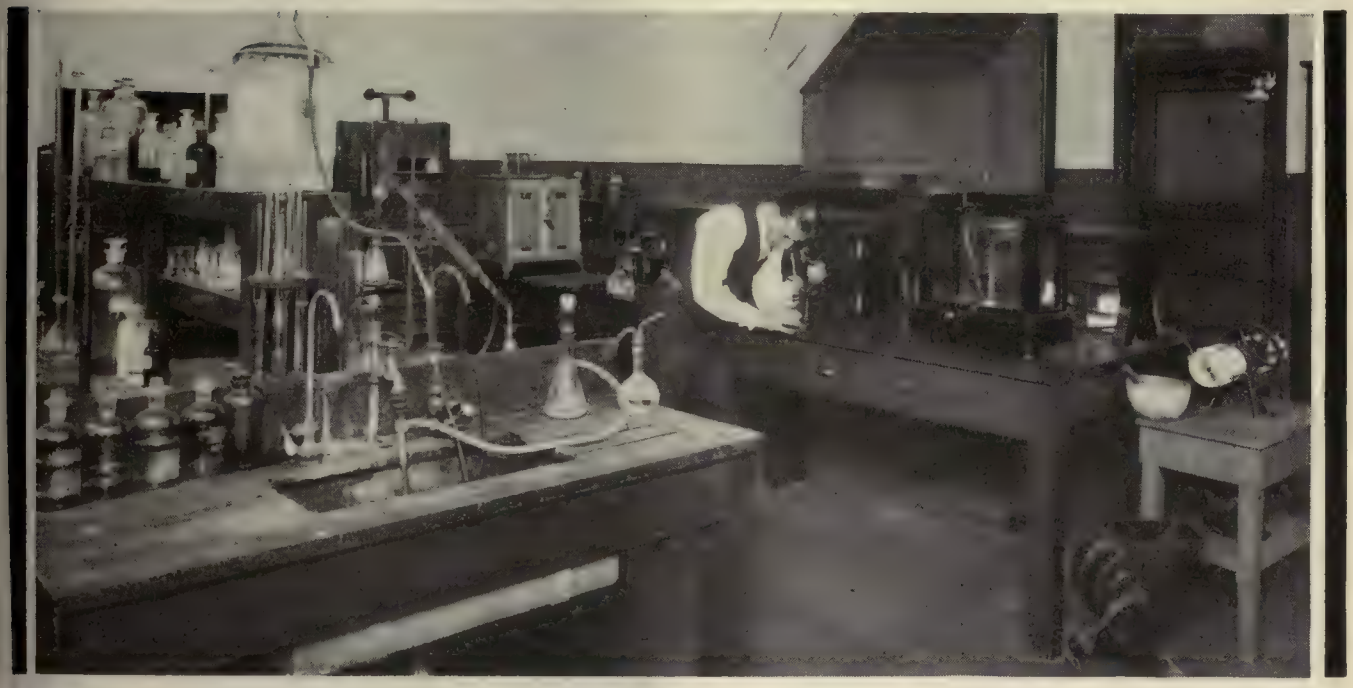
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◆◆ BEHIND THE PYRAMIDS—1 ◆◆

N C C

Continually in Control ...the LABORATORY



WHEN we say that National Pyramid Brushes are a laboratory product we do not mean that they are merely designed by our engineers and scientists. Our laboratory goes far beyond design. It is actually in complete and final control of all raw materials, of each manufacturing process, and of the final finished brushes. Every material and every process must meet rigid specifications. Nothing that fails to pass these specifications can be used.

The very first step in the manufacture of National Pyramid Brushes is the purchase of the oil from which lampblack is to be burnt. This oil is bought under close specifications, and each shipment is tested by us to make sure it follows those specifications in viscosity, flash point, residue, and chemical composition.

The lampblack produced from this oil is tested for volatiles and ash, the latter being held down to a few hundredths of one per cent. All other raw materials—pitch, graphite, copper and other substances—are similarly tested with the utmost care and precision.

In the long manufacturing process, frequent samples are analyzed by the laboratory. Machine operation is closely watched. Furnace temperatures are governed by pyrometers.

Many more than 36 scientific controls are exercised by our laboratory over the 36 major manufacturing operations in our factories.

National Pyramid Brushes are as scientifically made and as uniform as are the electrical machines on which they are used.

NATIONAL CARBON COMPANY, INC.

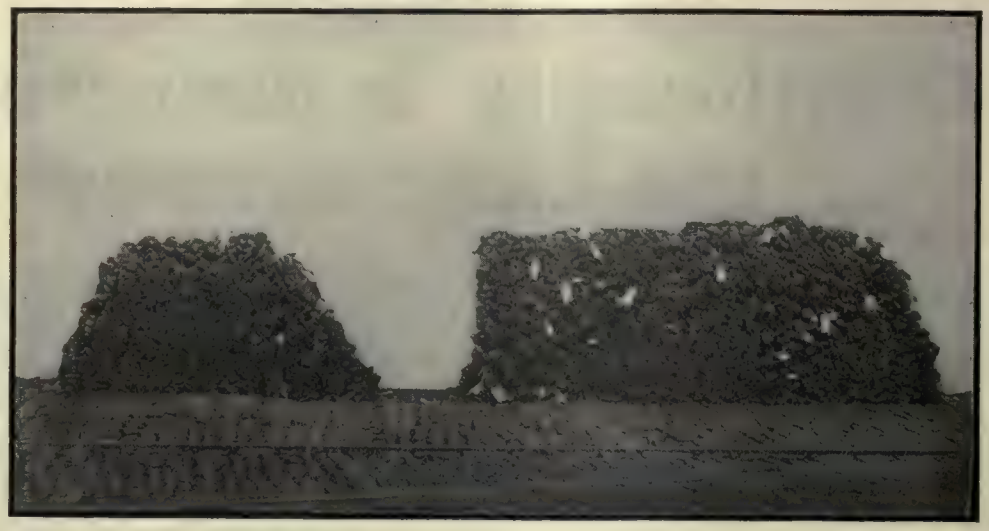
Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division

Cleveland, Ohio — SILVER STRAND CABLE TRADE MARK REGISTERED — San Francisco, Cal.

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Do You Buy Brake Shoes On Price Or Ultimate Cost?

THERE'S no guesswork connected with the use of Diamond "S" Brake Shoes on all cars. Every property which has standardized on the Diamond "S" type shows a lower brake shoe cost per car mile and uses fewer brake shoes—an additional annual saving in labor cost of application and removal of shoes.

The photograph shows two piles of worn out Brake Shoes. The smaller pile shows the Diamond "S" scrap left after doing the same amount of work as the Cast Iron shoes in the larger scrap pile.

"Best by Test"

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

30 CHURCH ST., NEW YORK
332 SO. MICH. AVE., CHICAGO

The Best Lubricant *is an abrasive – if mixed with grit*

More Reasons Why

1. They WEAR longer because they are built of tough and durable deep drawing steel properly annealed and are supported by strong malleable iron brackets.
2. They insure against VIBRATION because they are one-piece seamless construction and have no rivets to work loose.
3. They absolutely prevent the entry of DIRT and the escape of grease, because they are seamless, with overlapping joint between the halves.

IT doesn't take long for a lubricant that is accumulating dirt and grit to change into a grinding compound.

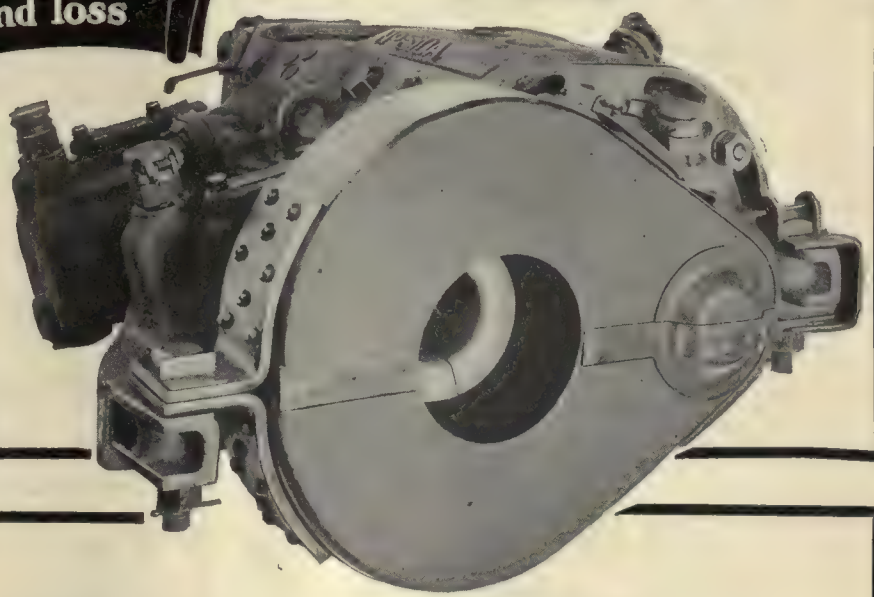
Gears running in such a lubricant wear quickly and run up a big maintenance bill.

Chillingworth Gear Cases provide the utmost insurance against gear maintenance costs.

The records of users of our Gear Cases are convincing evidence:—ask any of them.

Chillingworth Gear Cases – often the determining factor between profit and loss

A typical Chillingworth Gear Case installation. Note the one piece construction and perfect "tailored fit" of the halves.



GEAR CASES That FIT At No Extra Cost to You

Every Chillingworth Gear Case is "tailor fit" to your sample motor in our shops before being shipped out. This insures perfect interchangeability of any of the halves of the like gear cases on like motors—an economy for you.

This "custom building" creates the great users acceptance of our gear cases.

Chillingworth Manufacturing Co.

Jersey City, N. J.

Representatives:

Railway & Power Eng. Co. Canada

J. W. Gerke New York

A. P. Champin France

Tool Steel Gearing & Equip. Co. England

More-Jones



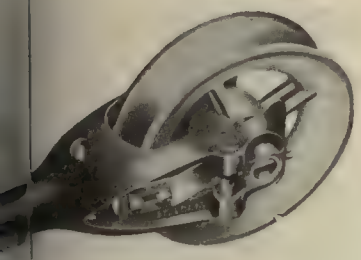
Quality Products always show u

This organization has specialized in certain street car equipment and has perfected every one of their products so that all guessing and experimenting is eliminated. Because of a complete knowledge of operating needs and the proper research facilities we have been able to successfully solve certain operating problems by supplying the proper equipment. When you specify More-Jones Quality Products you are sure that you are bringing new economies to your street car operation.

Buyers of experience know that it is false economy to save on the initial purchase.

Why not profit by the more than fifty years of specialization of this organization. Let us help solve your problems. We will be glad to co-operate with you.

More than 50



More-Jones Trolley Wheels

They are finished and bored in one operation, thus insuring proper balance. The metal used is exceedingly tough— an alloy of purest new metal, having maximum conductivity— which provides greater mileage without damage to the overhead lines.

V-K Oil-less Wheels for City and Suburban service and More-Jones lubricated Wheels for high speed requirements insure lower ultimate cost.



o your advantage in net earnings

"Tiger" Bronze Axle and Armature Bearings

T lead content, that we scientifically incorporate into this al y, minimizes frictional wear, resulting in less frequent re acements. Finished oversize or undersize to a perfect r ning fit with your axles and housings and expertly ma- ch ed in strict accordance with your specifications. We r mmend the incorporation of our celebrated Armature Babbitt metal into the Armature bearings. "Tiger" Bronze Axle and Armature Bearings insure maximum service under the hardest operating conditions.



More-Jones Armature Babbitt Metal

Standard on the majority of Electric Railway Systems in this country. Specially formulated for the exacting requirements of Electric Railway Armature Bearing maintenance.

Its high heat radiation minimizes friction, even under the most trying circumstances.

A trial is the most conclusive proof of its superior inherent characteristics.



Further information and prices sent on request.

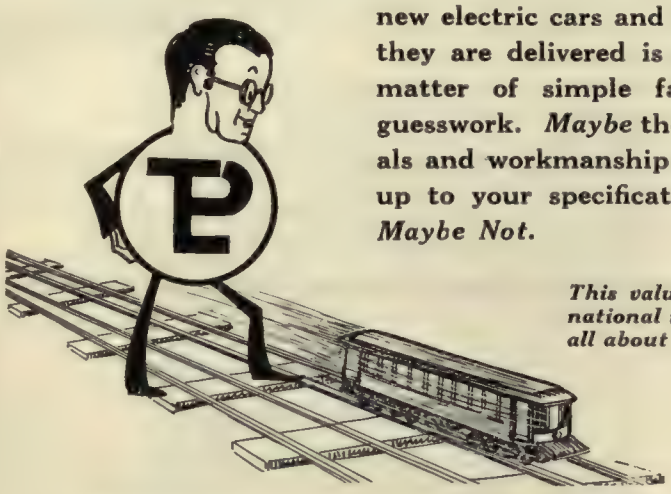
NATIONAL BEARING METALS CORPORATION

New York, N. Y. Jersey City, N. J. *St. Louis, Mo.* Portsmouth, Va. Pittsburgh, Pa. Meadville, Pa.

MORE-JONES QUALITY PRODUCTS

ears of Service

P. T. L. TAKES THE "MAYBE" OUT OF YOUR CAR CONSTRUCTION



Just what happens between the time you place your order for new electric cars and the time they are delivered is purely a matter of simple faith and guesswork. *Maybe* the materials and workmanship measure up to your specifications and *Maybe Not.*

A perfect guardian of your interests in this case is a P.T.L. Inspector. He takes the "maybe" out of your car construction by progressively inspecting all materials and workmanship that goes into your cars. If anything is not up to your specifications you are immediately notified.

This valuable P.T.L. Inspection service is national in its scope. Bulletin 28 tells you all about it.

PITTSBURGH TESTING LABORATORY

Branch Offices in Principal Cities

PITTSBURGH **PENNA.**

LORAIN

Girder Rails, Special Trackwork, Switches, Frogs and Crossings in Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail

The Lorain Steel Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

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Sales Offices:

Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh

Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
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As year after year passes on—



Plush

remains the preferred upholstery material

During the more than 37 years that Massachusetts Mohair Plush has been the railroad standard, it has given many roads over twenty years of active service!

Plush is equally desirable for street cars and busses, as it is not only serviceable but is the most comfortable seating material now in use, and its varied patterns and colorings add to the attractiveness of the cars.

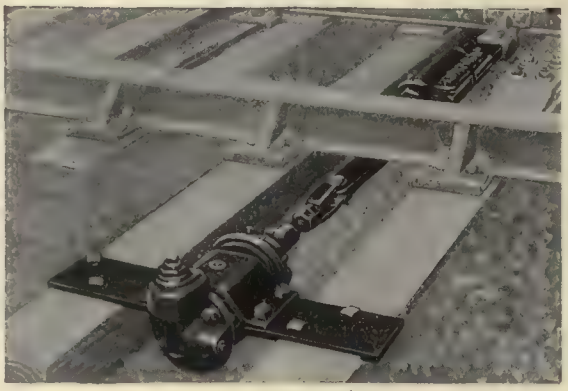
Specify Massachusetts Plush for those new cars and busses you are buying this year. Send *now* for samples and quotations.

MASSACHUSETTS MOHAIR PLUSH CO.
Makers of BAY STATE PLUSH
Main Office:
80 Federal St., BOSTON, MASS.

Railway Representatives
Midgley & Borrowdale
1822 McCormick Building, Chicago, Illinois

RACOR

To Save Wear on Spring Switches



Oil Cylinder Retarding Dash Pot

THE Racor Dash Pot greatly reduces the wear on the inside of the points of spring switches that are habitually trailed through.

This device acts on the principle of a door check and is used to retard the return of the switch points to normal position. When the switch points are struck by the flange, the points are free to move to the reverse position but are retarded when they start to return. Thus the blow from succeeding wheels is very slight and the wear on the inside face of the points is greatly reduced.

The Racor Dash Pot is sure in action and operates under all climatic conditions.

The Racor Dash Pot is used successfully with the Ramapo Automatic Return Switch Stands, Styles Nos. 37, 38, and 39, or with rigid switch stands connected to switch through a heavy type spring rod.

Send for complete descriptive information.

RAMAPO AJAX CORPORATION

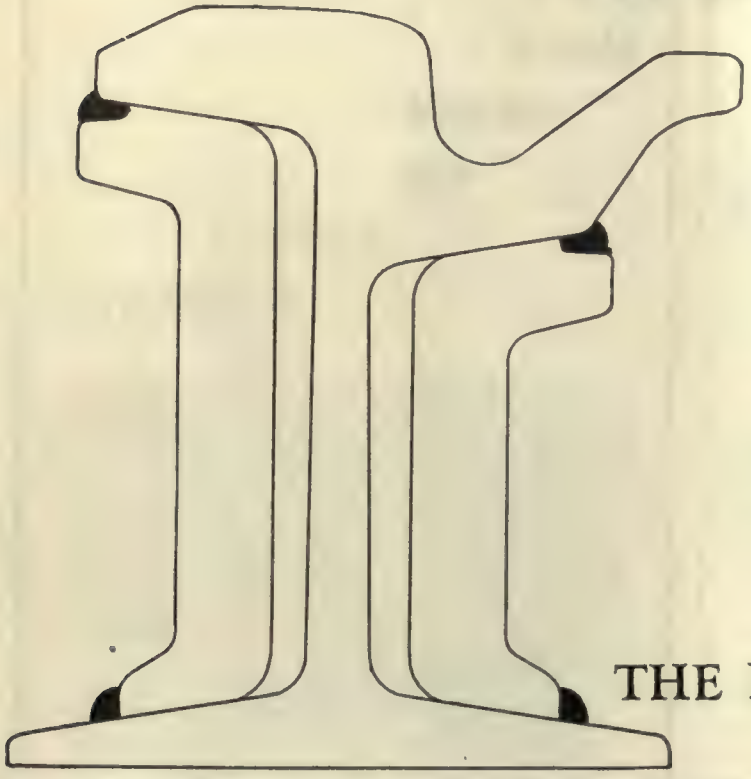
Main Office—HILLBURN, NEW YORK
SALES OFFICES AT WORKS, ALSO
30 CHURCH STREET, NEW YORK
McCORMICK BUILDING, CHICAGO

RACOR PACIFIC FROG & SWITCH CO. Los Angeles—Seattle

CANADIAN RAMAPO IRON WORKS, LTD Niagara Falls, Ontario

Eight Works—
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Pueblo, Colorado. Superior, Wis. Los Angeles, Cal. Niagara Falls, Ont.

"WELD PLATES"



For EFFICIENT, ECONOMICAL

JOINTS

Do you believe in statistics? Rely on performance records? If so the performance records of the many "Weld Plates" now in use will convince you that they lead the bar-weld joints in efficiency and economy.

"Weld Plates" represent the most modern welding practice. They are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom—the suitability for the use of short bolts.

A trial will convince you of their efficiency and economy.

THE RAIL JOINT COMPANY

165 Broadway, New York



TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER

This 3-Section

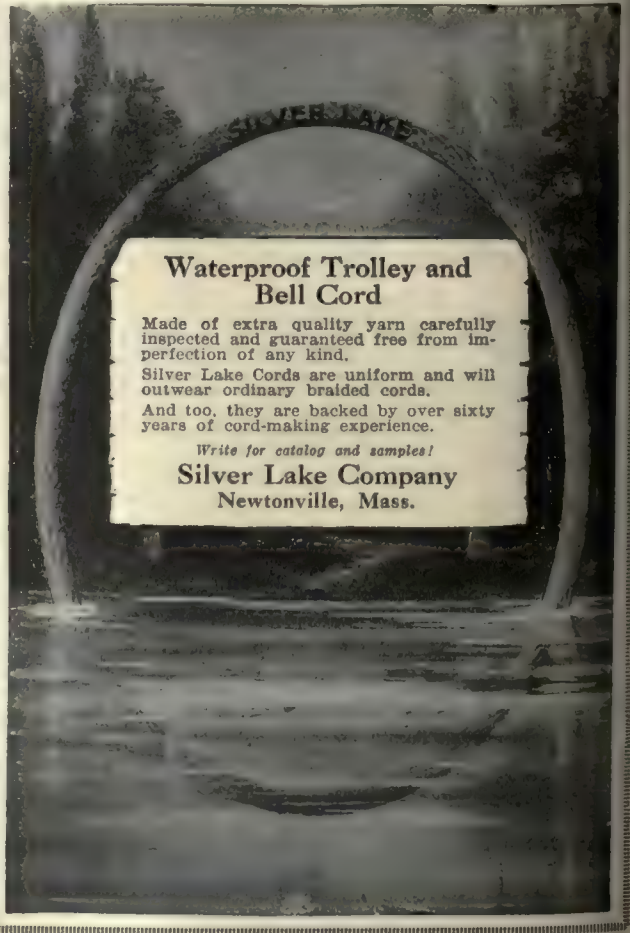
is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.

Trenton, New Jersey, U. S. A.



EARLL

Trolley Catchers and Retrievers

Fast and positive

Earll Retrievers and Trolley Catchers are in motion at the first jump of the pole. They have the pole below the danger line in time—every time.

Economical in first cost and installation, their maintenance consists of a squirt of oil three or four times a year; their appearance is dignified and simple; and the construction is designed for hard service.

Few parts, positive in operation with a powerful mechanism, insure perfect results. Wet rope has no terrors for an Earll.

Get an Earll estimate on your cars. Find out more about this important device. Bulletin on request.



This is all there is to the lubrication of an Earll. Just a few spoonfuls of oil every three months.

C. I. EARLL, YORK, PA.

General Foreign Agents:
International General Electric Co.,
Schenectady, N. Y., U. S. A.

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Toronto, Ont.

The 1929 Budget for Pole Line Maintenance and Construction



APPROPRIATIONS for this departmental budget may be smaller than expected, taxing your ingenuity to get the best results for the least money. Here are facts about M.I.F. Pole Hardware Specialties that have an important direct bearing—

Williams Pole Mounts

Are chargeable to capital investment or betterment account, whether for wood or tubular pole reclamation. Only labor of installation is charged to maintenance expense account. Therefore, appropriations for maintenance will go much farther—and dividends may be earned on the resulting increased capital investment, for which other funds are available.
Illustration indicates range of sizes up to 12 in. for tubular poles. Absolutely essential for efficient, economical new pole installations on concrete walls, bridges, etc.

Pole Reinforcing and Extension Clamps

Overcome the necessity for replacing tubular poles corroded at ground line or at joints. Stronger, more durable and more economical than other methods. Also provide means for extending poles for wider spans or additional circuits with utmost facility, economy and strength. Real money savers.

Span Wire Insulator Hangers

Provide means for carrying control cables, signal wires, etc., out on span wires away from trees. Reduce delays and emergency repairs. Made in several types for varied service.

Send for literature with prices.

Malleable Iron Fittings Co.

Pole Hardware Department
Factory and New England Sales Office: Branford, Connecticut
New York Sales Office:
Thirty Church Street
General Sales Agents elsewhere in U. S.:
LINE MATERIAL COMPANY, South Milwaukee, Wis.
Canadian Distributor: Canadian Line Materials, Limited, Toronto



Bates-Truss Poles for Trolley Suspension

MODERN transportation demands modern methods. The Bates-Truss Pole is the solution of trolley suspension problems. The general tendency of electric railways toward the increased use of Bates-Truss Poles is significant in these days of high costs and keen transportation competition.

Structural simplicity, combined with lasting strength and fine appearance, makes the Bates-Truss Pole ideal for all forms of overhead construction. Let us quote you on poles, structures or towers.

BEST
Bates Expanded Steel Truss Co.
EAST CHICAGO, IND.

Keeps cars clean and attractive

CLEANING cars regularly, inside and out, the Oakite way prevents the accumulation of traffic grime; promotes good appearance and scales down maintenance expenses.

Less time and effort are required to brighten windows, floors, seats, paintwork and metal fixtures. Oakite methods can be depended upon to keep car interiors spotless and sanitary. Moreover, by removing the dirt and grime that causes deterioration, regular cleaning with Oakite materials reduces the need for frequent repainting and overhauling.

Write for booklet "Cleaning in Railroad and Car Shops." It contains facts and formulas to help you with many cleaning operations.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

OAKITE
TRADE MARK REG. U.S. PAT. OFF.
Industrial Cleaning Materials and Methods

TO ERR . . . IS HUMAN

BUT with Nachod Signals the human element is entirely removed. They are entirely "automatic." Passengers are assured safe, swift transportation.

Nachod 3-indication signals for double track rear protection show red for occupied block, with yellow in the rear, and green in all signals in the rear of the yellow.

Nachod signals enable your cars to get over the line speedily and safely to bring in the revenue.



Type N — 3 indication color light signals on Northern Ohio Power & Light Co. between Canton and Massillon.

N-A-C-H-O-D
Spells "Safety"

We also make Highway Crossing Signals and Headway Recorders. Write for catalog.

Nachod & United States Signal Co.
LOUISVILLE, KY.

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Railway and Utility Supplies

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Elliott-Thompson Coils perform better, wear longer, reduce maintenance costs.

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You get the added advantage of full efficiency from the start, and the finer performance that makes for better transportation.

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THE OHMER Fare Register Company was the first to invent, manufacture and sell registers to indicate and print a record of all kinds of fare collections. This company was also the first to make a ticket-printing and recording taximeter. For thirty years we have maintained a dominant leadership in the transportation industry, a distinctive OHMER field.

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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Your Name

in this space in all issues where larger display space is not used backs up your advertising campaign and keeps your name in the alphabetical index.

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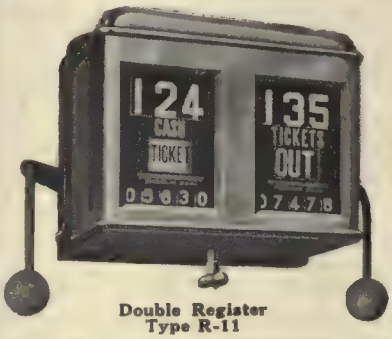
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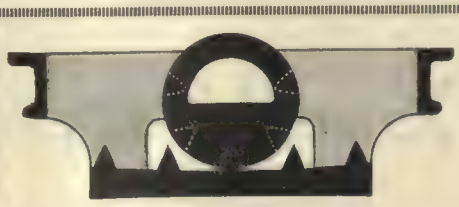
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NOTICE is hereby given that the City Commission of the City of Springfield, Ohio, is desirous of receiving proposals from operators of municipal transportation systems for the furnishing of an adequate transportation system for said city and that such proposals will be received up to and including Friday, February 1st, 1929.

Proposals will be received from operators of either electric trolley cars, motor busses or trolley car and bus combined or other adequate method providing municipal transportation. Springfield lies in the mid part of Ohio and is approximately 72,000 in population, and is a fast growing city.

Such proposals should state the term for which franchise is desired and the terms and conditions under which such operators will operate same and preferably should set forth the rate or rates of fare desired in order that full and complete consideration may be given same by the City Commission.

The Commission reserves a reasonable time after the submission of such proposals within which to inquire into and consider the relative merits of such proposals and further reserves the right to reject any and all such proposals.

By order of the City Commission of the City of Springfield, Ohio.

CLYDE E. WALLINGFORD
Clerk of the City Commission

A change in an owner's requirements has put

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6-cylinder, 28-passenger

White Parlor Car Busses

in our Used Bus Department

Write for full particulars

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Get Your Wants into the Searchlight



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We have been in the scrap metal business since 1898—the time of the Spanish War—hence our slogan "Ever for peace, always for scrap." We know what we are about, and have the facilities for doing our work well. The good will built up among the many traction companies, for whom we have already worked in dismantling their old and worn out equipment, proves it.

The "economics" of turning your obsolete equipment into cash for use in purchasing new and modern equipment or reducing the overhead of maintaining a pasture for worn out cars needs no serious discussion.

Hence we can suggest only one thing—that you direct your inquiries to us in order to find out the full details of our ability to turn your obsolete equipment into good use.

We are not Alchemists—
But—
we turn iron and steel
into gold and silver.

L. Schiavone & Bonomo Bros. Inc.

Jersey City, New Jersey

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Tr. Br. Co.

Air Circuit Breakers
Roller-Smith Co.

Ammeters
Roller-Smith Co.

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Columbia Machine Works
Elec. Service Supplies Co.

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Ramapo Ajax Corp.

Automatic Safety Switch Stands
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Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Illinois Steel Co.
Westinghouse E. & M. Co.

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Timken-Detroit Axle Co.

Axles, Trailer & Motor Bus
Timken-Detroit Axle Co.

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National Bear. Metals Corp.

Babbitting Devices
Columbia Machine Works

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International Reg. Co., The

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Nichols-Lintern Co.

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Johnson Bronze Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co., A.

Bearings, Roller
Hyatt Roller Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co.

Bearings, Thrust
Timken Roller Bearing Co.

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Cincinnati Car Co.
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Railway Trackwork Co.

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Brill Co., The J. G.
Dodge Bros.

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National Tube Co.

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Roller-Smith Co.

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American Steel Foundries
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Cincinnati Car Co.
National Ry. Appliance Co.
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Brill Co., The J. G.

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Cincinnati Car Co.
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Safety Car Devices Co.
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Morganite Brush Co., Inc.
National Carbon Co.

Brushes, Metal Graphite
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Twin Coach Corp.

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Brill Co., The J. G.

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Cincinnati Car Co.
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American Steel Foundries
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Columbia Machine Works
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Sullivan Machinery Co.

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Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Track (See Track Special Work)

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Ohio Brass Co.
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(Continued on page 114)

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Riding Comfort



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Electric Service Supplies Co.
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Cincinnati Car Co.
Star Brass Works

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Tuco Products Corp.

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Tuco Products Corp.

Flooring, Fireproof
Irving Iron Works

Flooring, Non-Slipping
Irving Iron Works

Flooring, Open Steel
Irving Iron Works

Flooring, Steel, Subway
Irving Iron Works

Flooring, Ventilating
Irving Iron Works

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Cincinnati Car Co.
Standard Steel Works Co.

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Bethlehem Steel Co.
Lorain Steel Co.
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Standard Oil Co. (Indiana)
Texas Co., The

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Economy Electric Devices Co.

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Cincinnati Car Co.

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Standard Steel Works Co.

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Columbia Machine Works
Electric Service Supplies Co.
Westinghouse E. & M. Co.

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Bemis Car Truck Co.
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Tool-Steel Gear & Pinion Co.

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General Electric Co.
North East Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grating, Steel Subway
Irving Iron Works

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Texas Co., The

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Metal & Thermit Corp.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

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Railway Trackwork Co.

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Lorain Steel Co.
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
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Elec. Service Supplies Co.
Ohio Brass Co.

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S. K. F. Industries, Inc.

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National Bear. Metals Corp.
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Star Brass Works

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Consolidated Car Heating Co.
Economy Electric Devices Co.
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Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car Stove
Smith Heater Co., Peter

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Elec. Service Supplies Co.
General Electric Co.
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Columbia Machine Works
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International Reg. Co., The

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Ramapo Ajax Corp.

(Continued on page 116)



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Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

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Trolley Wheels (See Wheels Trolley)

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Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Griffin Wheel Co.

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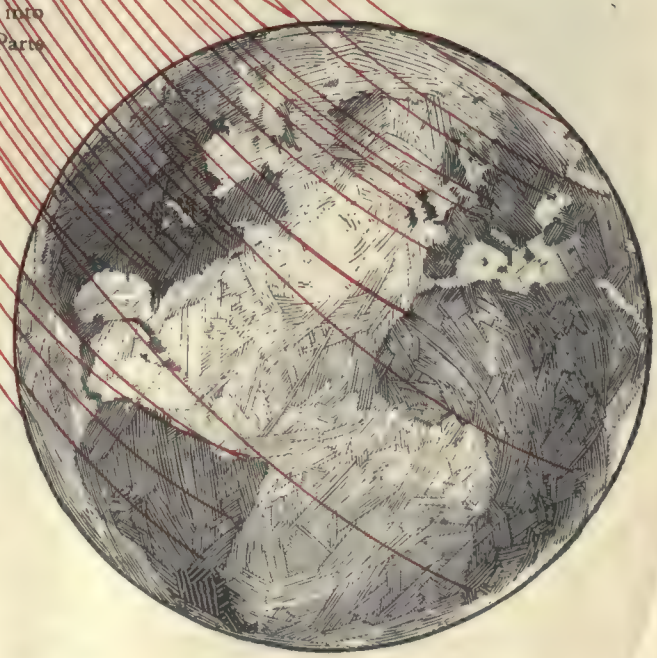
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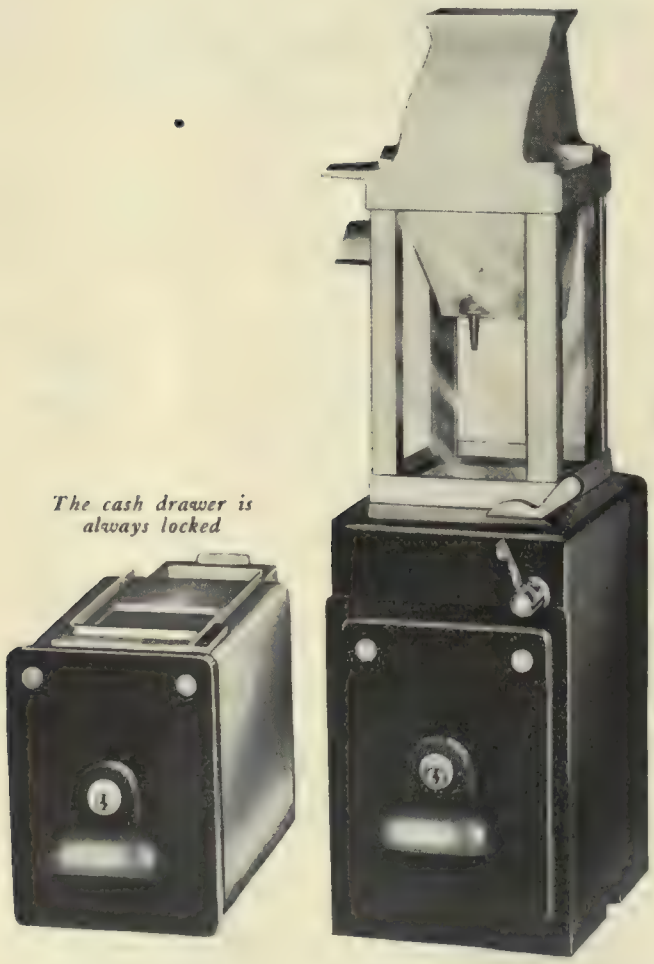
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4. **Furnished with hand operated register as an integral part, or without register.**
5. **Smaller and lighter than any other fare box.**
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ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

— A —

Aluminum Company of America. 64
American Brake Materials Corp., 46-47
American Brake Shoe & Foundry Co. 98
American Brass Co., The..... 84
American Brown Boveri Electric Corp. 42
American Car Co.120 & Third Cover
American Fork & Hoe Co., The. 53
American Steel & Wire Co..... 89
American Steel Foundries 16
Anaconda Copper Mining Co... 84
Anderson Mfg. Co., A. & J. M.. 80

— B —

Bates Expanded Steel Truss Co.106
Beeler Organization 108
Bell Lumber & Pole Co.....109
Bell Register Co.....118
Bemis Car Truck Co..... 93
Bender Body Co., The..... 33
Bethlehem Steel Co.....82-83
Bibbins, J. Roland.....108
Brill Co., The J. G.120 & Third Cover
Buchanan & Layng Corp.....108
Buda Co., The..... 52

— C —

Carnegie Steel Co..... 86
Chase & Co., L. C..... 79
Chillingworth Mfg. Co..... 99
Cincinnati Car Co..... 21
Cities Service Co.....26-27
Cleveland Fare Box Co.....119
Collier, Inc., Barron G.....90-91
Columbia Machine Works.....107
Commonwealth Steel Co..... 95
Consolidated Car Heating Co... 48
Cowdrey Brake Tester Organization, Inc..... 49

— D —

Dayton Mechanical Tie Co., Insert 87-88
De Vilbiss Co., The..... 71
Differential Steel Car Co., The.. 45
Dodge Brothers.....Insert 57 to 60

— E —

Ekell, C. I.....105
Economy Electric Devices Co..18-19
Electric Ry. Equipment Co..... 85
Electric Railway Improvement Co. 44
Electric Service Supplies Co.... 15
Elihu-Thompson Electric Co...107

— F —

Faile & Co., E. H.....108
Ford, Bacon & Davis.....108
"For Sale" Ads.....110-111

— G —

General Electric Co., Front Cover & 30
General Motors Truck Co., Insert 37 to 40
Goodrich Rubber Co., The B. F., Insert 69-70
General Tire & Rubber Co..... 41
Globe Ticket Co..... 56
Griffin Wheel Co..... 96

— H —

Hale-Kilburn Co.....62-63
"Help Wanted" Ads.....110-111
Hemphill & Wells 108
Holst, Englehardt W.....108
Hyatt Roller Bearing Co..... 81

— I —

Illinois Steel Tie Co..... 77
International Creosoting & Construction Co. 22-23
International Register Co., The.109
International Steel Tie Co..... 8-9
Irving Iron Works Co..... 94

— J —

Jackson, Walter 108
Johnson Bronze Co.....72-73
Johnson Fare Box Co.....109

— K —

Kelker, DeLeuw & Co.....108
Kuhlman Car Co.120 & Third Cover

— L —

Long Mfg. Co., The..... 35
Lorain Steel Co.....102

— M —

Mahon Co., The R. C..... 61
Malleable Iron Fittings Co....105
Massachussetts Mohair Plush Co.103
Master Plier Corp.....109
McCardell Co., J. R.....104
McClellan & Junkersfeld 108
Metal & Thermit Corp.....24-25
Mica Insulator Co..... 78
Morganite Brush Co..... 50

— N —

Nachod and U. S. Signal Co....106
National Bearing Metals Corp., 100-101
National Brake Co., Inc..... 31
National Carbon Co.....34-97
National Pneumatic Co..... 17
National Ry. Appliance Co.....109
National Tube Co..... 74
Nichols Lintern Co.....109
North East Electric Co.....117

— O —

Oakite Products, Inc.....106
Ohio Brass Co..... 6-7
Ohmer Fare Register Co.....107
Okonite-Callender Cable Company, Inc., The..... 68
Okonite Co., The..... 55

— P —

Perey Mfg. Co., Inc.....109
Pittsburgh Testing Laboratory..102
Positions Wanted and Vacant, 110-111

— R —

Rail Joint Co.....104
Railway Track-work Co..... 5
Railway Utility Co.....113
Ramapo Ajax Corp.....103
Richey, Albert 108
Roebling's Sons Co., John A....109
Roller-Smith Co. 68

— S —

S.K.F. Industries, Inc..... 92
Safety Car Devices Co..... 20
Sanderson & Porter.....108
Scarr Transport. Service, Inc..108
Searchlight Section 110-111
Silver Lake Company 104
Smith Heater Co., Peter.....109
Standard Oil Co. (Indiana).... 36
Standard Steel Works Co.....66-67
Star Brass Works.....119
Stevens & Wood, Inc.....108
Stone & Webster.....108
Stucki Co. 109
Sullivan Machinery Co..... 51

— T —

Texas Co., The..... 75
Timken-Detroit Axle Co..... 32
Timken Roller Bearing Co.....115
Tool Steel Gear & Pinion Co... 76
Tuco Products Corp..... 43
Twin Coach Corp....Insert 11 to 14

— U —

Una Welding & Bonding Co...109
Union Switch & Signal Co..... 29

— W —

"Want" Ads 110-111
Wason Mfg. Corp.120 & Third Cover
Waukesha Motor Co....Back Cover
Westinghouse Elec. & Mfg. Co., Second Cover & 4
Westinghouse Traction Brake Co. 10-28
Wharton, Jr. & Co., Inc., Wm.. 65
"What and Where to Buy," 112-114-116
White Eng. Corp., The J. G...108
Wish Service, The P. Edw.....109

SEARCHLIGHT SECTION

Classified Advertising

Classification — Page

BUSINESS OPP. 110
EMPLOYMENT 110
USED AND SURPLUS EQUIPMENT 110
Illinois Terminal of Springfield 110
Schiavone L. & Bonomo Bros., Inc. 111
Wallingford, Clyde E., ...110
White Co., The.....110

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



FARE
BOXES for BUSES

Let us tell you of this especially designed box for this class of service.

The Cleveland Fare Box Co.
4900 Lexington Ave., Cleveland, O.
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

COIN COUNTING And Sorting Machines CHANGE CARRIERS Tokens







BRILL MODERN



Seventy-five New Cars for Cleveland Railway Co.

During 1928, the Cleveland Railway Company received seventy-five new cars from The G. C. Kuhlman Car Company. Fifty new-type single cars and twenty-five articulated cars were available for service.

Both types of cars are attractive, speedy and comfortable. The articulated units are especially well adapted for rush-hour service because they are designed to transport a large number of passengers without increasing traffic congestion. Loading and unloading is accomplished in the shortest possible time. Operating economies and improved schedules have already been demonstrated.

With the aid of Brill-Kuhlman equipment, 1929 promises to be a record year for the Cleveland Railway Company.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO — WASON MANF'G CO. SPRINGFIELD, MASS.
Pacific Coast Representative: Rialto Bldg., San Francisco

ELECTRIC CARS

New Greyhound Lines Sleeping Coach Powered by Waukesha Engines



"L-Head Engines, they take better care of themselves."

A Pullman car on rubber tires, a motor equipped with standard sleeping berths, diner and observation parlor—must be driven by a perfect power plant.

For this palace on wheels there should be no unpleasant engine vibration—reliability of course could not be sacrificed—and so to meet the rigid service requirements, the Waukesha "Big Bus Sixes" were chosen.

Waukesha Big Bus Sixes are positively self-effacing. 3½-inch diameter crankshafts, "girder" type crankcases, "truncated" cylinders, full-pressure filtered oil lubricating system, and fuel-saving Ricardo heads—these features insure long vibrationless service.

Waukesha heavy-duty, six-cylinder bus engines are built in sizes ranging from 50 H. P. to 120 H. P. Write for Bulletin describing the size that fits your needs.

901

AUTOMOTIVE EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY

New York Office: 8 West 40th Street

Waukesha, Wisconsin

San Francisco: 555 Howard Street

Exclusive Builders of Heavy-Duty Internal Combustion Engines for over Twenty Years



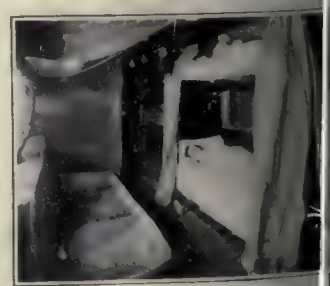
Between the forward and rear compartments is a compact kitchenette, with electric refrigerator, gas range, pantry locker, kitchen sink, and hot and cold running water. From the kitchenette, light lunches, beverages, etc., are served.



The rear compartment is made up as a spacious combination observation parlor and dining room. It is equipped with dining and card tables, radio, phonograph and electric fans.



To the left of the kitchenette is a complete tile walled bathroom with wash basin, toilet and shower bath. Hot water for this and the kitchen sink is supplied from a standard home-size coil heater.



Finished in polished walnut and deep mohair upholstery, the interior is a model of luxury and convenience. The forward compartment provides standard Pullman type berths for nine passengers.

MAINTENANCE AND CONSTRUCTION ISSUE

ELECTRIC RAILWAY JOURNAL

Hill Publishing Company, Inc. JANUARY 19, 1929 Twenty Cents per Co

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FIGURES!

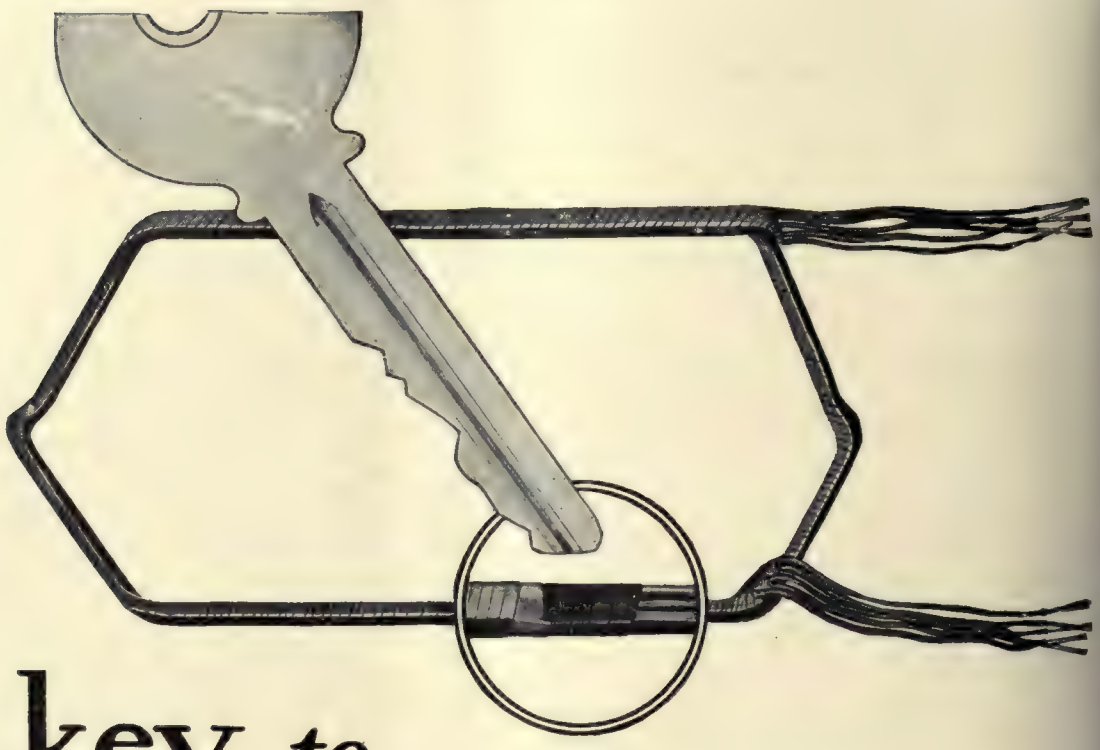
—are always interesting. Especially when they show a remarkable reduction in the cost of an operation.

The Public Service Co-ordinated Transport Co. of Newark, N. J. recently built over two miles of double track, using Steel Twin Ties. Four concrete mixers, four compression tampers and two tie layers were used. The total labor cost of tearing out the old track and building the new was $1.25 per single track foot. Of this figure, only 70c. represented the labor cost per track foot *for new track construction.* This figure is more remarkable when the average labor rate, which was 55c. per hour, is taken into consideration.

Steel twin ties and modern machine methods have scored again.

May we discuss with you your 1929 track building program? We can show you some interesting figures.

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, OHIO



A key to Lower Maintenance

Westinghouse Coil Manufacturing Standards

1 High grade copper and insulating materials used.

2 Correct shape insuring proper fit.

3 Ample insulation provided on all parts of coil.

4 Reinforcement provided at cross-overs.

5 Tinned wire used on majority of sizes.

6 Three treatments of dipping and baking.

7 Thoroughly tested and inspected.

A RELIABLE calculation shows that each failure necessitating an armature rewind costs on the average $80. More than 50 per cent of this represents labor and overhead charges; less than 50 per cent for the Renewal Parts.

Use Westinghouse armature coils and cut-winding insulation, thereby assuring maximum armature life and low maintenance costs.

A reduction in armature rewinds nets a big saving.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse

T 30313

Electric Railway Journal

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1929

Advertising Index—Alphabetical 32; Classified, 28, 30, 32. Searchlight, 27

Vol. 73, No. 3 *Pages 107-148*

January 19, 1929

In This Issue

Editorials 107

Home Manufacture Frequently Is Self-Delusion—Maintenance Budget Figures Show Favorable Trends—Pedestrian Regulation Needed—Wide Variety of Maintenance Problems—Electrification Exceeds Expectations—Give Finance the Thought It Deserves

Construction Details of the New Birney Car 117

BY C. O. BIRNEY

The author gives for the first time, in this article, the full design details of the new four-wheel Birney car, supplementing the description of the general features which appeared in the Oct. 20 issue.

Great Northern Electrification Extended 110

All details of the locomotives, power sources and distribution system for the 73-mile electrified division of the railway, completed with the recent opening of the 8-mile Cascade tunnel, are given.

Methods Used in Babbitting Bearings Have Marked Effect on Lubrication 114

BY H. L. KAUFFMAN

This article, the third of a series on lubrication, contains information on caring for journals, using proper lining metals, rebabbitting bearings and selecting gear and pinion lubricants.

I.R.C. Builds One-Man Sand Drier 121

One-man operation is not confined to the cars of the International Railway, for the company has a complete sand drying plant of 10,000 tons per year capacity which can be operated by a single man.

Cement Floor Laid Beneath Loaded Stock Bins 116

Uniform Traffic Code Prepared for Wisconsin 124

Louisville Grade Crossings Eliminated 124

New Buses at the Berlin Automobile Show 124

Helpful Suggestions for the Electrical Repair Department 125

Maintenance Data Sheet 127

More Suggestions for Improvements in Railway Equipment 133

News of the Industry 136

Articulation in Seattle to Cost $20,000,000—New Police Head in New York City Studies Traffic—Comprehensive Subway and Rapid Transit System Proposed for Detroit—Mr. Storrs' Services Sought by Baltimore Company—Review of Jersey Bus Operation in Commissioners' Report

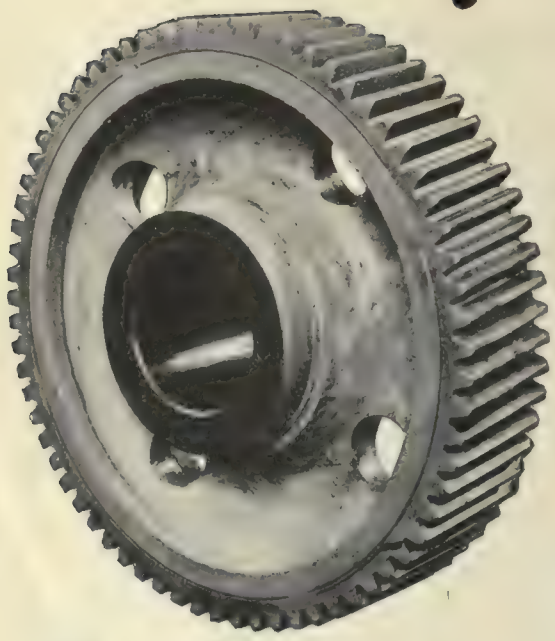
Golden Silence

with NOISELESS GEARS

IN modern street car operation, silence is golden. Golden because it means increased good-will and greater patronage; also less outlay for repairs.

In many ways Westinghouse-Nuttall gears are proof against noise. The smooth, even load transfer of the helical design prevents chattering. Even after long service, they do not become noisy from wear because the exclusive Nuttall BP heat treatment increases the life of these gears to four times that of ordinary gears.

In addition to these silencing qualities, Westinghouse-Nuttall has developed a device which eliminates the high-pitched ringing sound characteristic of all metallic gears. This consists of a wrought iron ring built rigidly into the rim on each side of the gear, with a non-metallic layer interposed between the rings and gear rim. This is the exclusive Westinghouse-Nuttall method of eliminating noise from these gears.



Westinghouse Electric & Manufacturing Company
Nuttall Works Pittsburgh, Pa.
Sales Offices in All Principal Cities of the United States and Foreign Countries

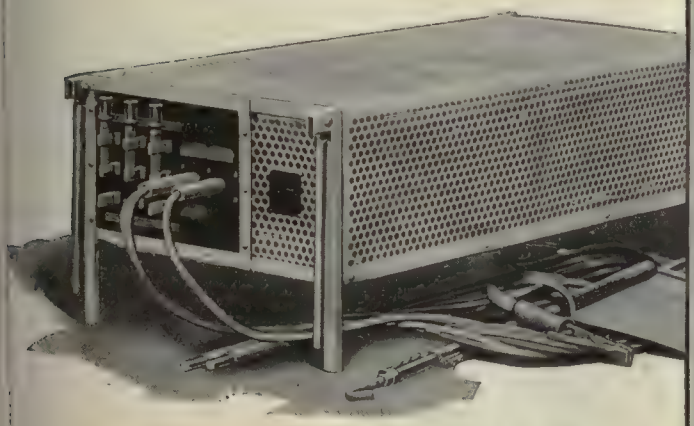
MEMBER A.E.R.A. 1929

Westinghouse

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DOLLAR AND SENSE INVESTMENTS

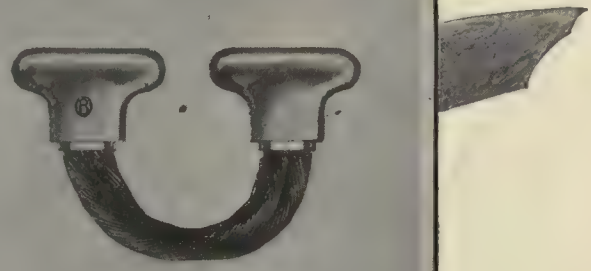
Matching Your Rail Bond Requirements



The O-B 400-600 Volt Electric Arc Welder has proven highly efficient for rail bonding by the copper or steel metallic-arc process. Full details on page 673, O-B Cat. No. 20.



O-B Titon Bond for welding to base of rail by copper metallic arc process. The Hevi-Bede Titon, for 100% joints; the AW-12 and AW-15 for base of rail are applied by this process.



O-B Type AW-8 Bond for welding to ball of rail by steel metallic-arc process. Type AW-7, AW-11, AW-13 and AW-6 Cross Bonds for base of rail are applied by this process.



O-B Type ST-2 Bond, for welding to ball of rail by gas-weld process. Type ST-5 for 100% joints is applied by this process.

REGARDLESS of the type of bond you prefer, or the manner of its application, you have one principal requirement —long service life.

That is what you get from O-B Rail Bonds. Each type of bond is designed to deliver 100% performance.

The shape and size of the terminal; the manner of enclosing the cable in the terminal, so that each strand is fully fused into the weld by the welding material; the internal copper sleeve which protects the strands and dampens vibration—all these are service betterments that lengthen life and lower maintenance costs. Their proven record is a worth-while guide in selecting bonds during 1929.

O-B Rail Bonds are made for ball or base of rail application; for standard or 100% joints; for copper or steel metallic arc welding, or for gas welding. A special type of welding rod is available for each type of application. Suggestions and samples gladly sent, without obligation.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1021B

Ohio Brass Co.

NEW YORK CHICAGO PHILADELPHIA PITTSBURGH ATLANTA CLEVELAND SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

BETTER RAIL, BETTER TRANSPORTATION

"How dear . . . . . oaken bucket"



A bucket of curve grease costs little—but it's dear indeed when you figure the cost of curve lubrication by hand swab.

Now let's be constructive—observe the R. T. W. Curve Oiler.

Deposits a uniform film of oil where it is needed most—on the gauge line of the rail, on the inside of the guard.

Saved several thousand dollars a year for one road as compared with hand swabbing.

Reduces Rail Wear,
Derailment Hazard,
Operating Noises.

Bulletin tells all, Want it?

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 50 Church St., New York
Chas. N. Wood Co., Boston.
Electric Engineering & Mfg. Co., Pittsburgh.
H. F. McDermott, 208 S. La Salle St., Chicago.
P. W. Wood Railway Supply Co., New Orleans, La.
Equipment & Engineering Co., London.
Frazar & Co., Japan.

3175

BETTER RAIL, BETTER TRANSPORTATION



Note the KEYSTONE specialties on these new Wilmington cars!

KEEPING pace with the progressive spirit of the community which it serves, The Delaware Electric Power Company recently installed ten modern low-level cars to operate on the streets of Wilmington, Del.

In its modernization program, The Delaware Electric Power Company is guided by a belief that the public will patronize public transportation where thought has been given to their comfort and convenience.

Following out this idea they equipped the new cars with Golden Glow, type DGC headlights with diffusing front lens—an up-to-date and snappy headlight equally suited for city or suburban service.

For interior lighting they chose type T Keystone dome lighting fixtures; the destination signs are two type 160 Hunter double signs per car, or in other words, four sign mechanisms showing destination and route numbers.

Ten complete Faraday signal systems consisting of two buzzers, two single stroke bells and twenty pushes per car insure efficient signalling for passengers and operator.

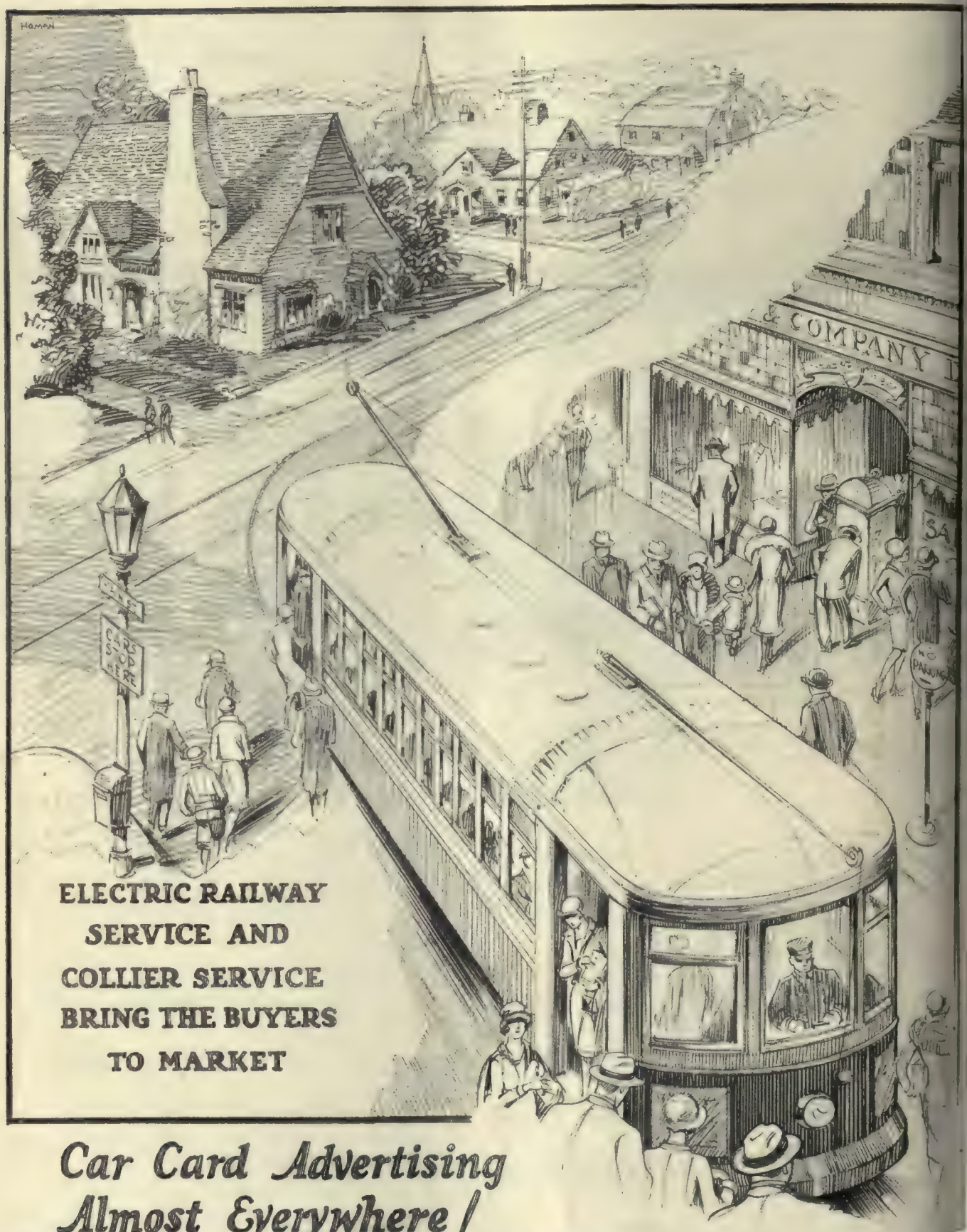
Keystone Motormen's Seats, also, were installed.

Keystone Specialties keep pace with modern transportation needs. Consult us on equipment.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District office at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY POWER AND INDUSTRIAL ELECTRICAL MATERIAL



Car Card Advertising Almost Everywhere!

BARRON G. COLLIER INC.

NEW YORK CITY

LOOK FOR THIS MARK

"STANDARD" STEEL PARTS

Vital Items of Equipment

A car that is equipped with "Standard" Steel Wheels, Axles and Armature Shafts is serving the public with the maximum of safety, speed and comfort and paying the operator a just return upon his wisdom in selecting "Standard" quality, for such vital items of equipment.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES:

CHICAGO
ST. LOUIS
NEW YORK
HOUSTON, TEXAS
PORTLAND, ORE.
RICHMOND, VA.
PITTSBURGH, PA.
MEXICO CITY
SAN FRANCISCO

WORKS: BURNHAM, PA.



One of the 100% Goodyear-equipped motor coaches of the Duluth-Superior Coach Company, Duluth, Minn.

Here's a Good Job well done!

Over every type of road—brick and cobble, concrete and gravel, oil, mud, snow and slime—with quick starts and stops in traffic, and long reaches at speed on the open highways—Goodyear Cord Bus Tires have carried the Duluth-Superior Coach Company's fleet of fourteen coaches for three years.

In this varied service a group of 34 x 7.5 balloons averaged 39,763 *miles per tire.* Another group of *Goodyear Cord Bus Tires* averaged 36,302 miles per tire. All tire removals for the three years average 23,621 tire miles per tire.

Experienced operators will realize the service is hard—street car feeding and inter-city transit, 58,073 coach miles per month over every sort of town and country going—that's the story, with Goodyears underneath, providing traction, cushioning and long wear, doing a hard job and doing it well at lowest possible tire-mile cost.

Certainly no recommendation could be more telling than the actual story of Goodyear low-cost tire performance in this and similar operations. Mr. S. L. Reichert, Vice-President of the Duluth-Superior Coach Company, feels much the same way about it. He writes, "I take pleasure in expressing our appreciation of the service and mileage obtained."

Whatever the conditions of your bus service, you too can enjoy low tire-mile costs with Goodyear Bus Tire equipment. It has been demonstrated over and over again that for dollars invested no other tires will show such ample returns.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built specially for bus service, and there are also Goodyear Rubber Tire Chains

GOODYEAR

Copyright 1929, by The Goodyear Tire & Rubber Co., Inc.



No. 8M5 Special



No. 327-M Special

No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

HEYWOOD-WAKEFIELD COMPANY

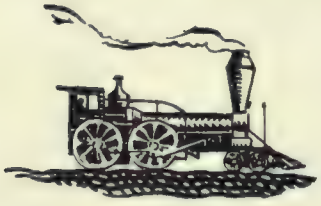
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516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

FIFTY YEARS OF GOOD



in 1879



"GOOD AS GOLD"

STEAM Railway men of the 70's were skeptical when Edward E. Gold suggested a new and better method of heating passenger coaches. Small wood-burning stoves were the accepted method. But stoves left much to be desired from the standpoint of passengers' comfort. The temperature near the stoves imitated the tropics at mid-day—while unfortunate travelers in the center of the car almost froze.

There was an even graver objection to the use of stoves. In the event of a wreck the stoves tipped over and the flimsy wooden cars of that day promptly caught fire, adding to the horror of the accident. These considerations prompted a trial of Gold's invention.

It was a success, and railways installed the new Gold heating apparatus.

GOLD

PROGRESSIVENESS

and fifty years later

In 1929 In the 50 years that have elapsed since that day the Gold Car Heating & Lighting Company has introduced improvement after improvement. Gold's first heater established a mechanical supremacy which never has been successfully challenged. Gold heating equipment is standard today for the best in car heating devices for both steam and electric lines.



Every step in the development of heating specialties has been the result of lengthy experiment and research. In consequence Gold equipment is perfectly adapted to the exacting demands of car construction and railway operating conditions.

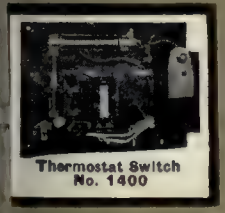
As each new type of Gold equipment was introduced it quickly proved itself practical and superior.

Today, Gold heating apparatus again represents an advance in the science of providing an ample volume of uniform heat to every car—at an economical price.

The Gold Catalog enters into detail regarding the perfection, convenience and economy of Gold equipment. Executives responsible for the specification or purchase of heating equipment should have a copy. Upon receipt of your name we will gladly send it.

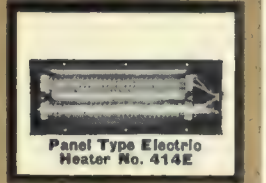


GOLD CAR HEATING & LIGHTING COMPANY


Thermostat Switch No. 1400


Cross Seat Type Electric Heater No. 405E


Thermostat No. 1250


Panel Type Electric Heater No. 414E

Bush Terminal Bldg. No. 2 - 220 - 36th St., Brooklyn, N. Y.

READ *how this test installation "sold"* these Kentucky traction officials

IN 1926, West Main Street, Frankfort, Kentucky, was improved with modern paving. At the same time, the officials of the Kentucky Traction and Terminal Company decided to make some improvements of their own along this street.

First of all, they gave the concrete right of way the protection of Carey Elastite Expansion Joint, applied transversely, to guard it unfailingly against expansion and contraction stresses. Then . . . to further improve the appearance of the roadway, to shock-absorb the cars, to reduce traction noises, and to provide a T-rail flangeway superior to hard paving material, they installed Carey Elastite System of Track Insulation.

And did this two-year test installation "sell" itself? The answer is emphatically "YES!" For the Kentucky Traction and Terminal Company has recently ordered Carey Track Insulation for two additional stretches of track along their right of way.

If you are planning any track construction work, certainly it will be to your advantage to have our representative call and tell you about this advanced traction improvement. Write.

THE PHILIP CAREY COMPANY

Lockland, Cincinnati, O.



CAREY Elastite System of Track Insulation, as used here by the Kentucky Traction and Terminal Company at Frankfort, is a preformed asphaltic compound, reenforced with asphalt-saturated fibres. It is impervious to moisture, and forms a durable, shock-absorbing cushion between the paving and the rails.



Carey Elastite

SYSTEM OF TRACK INSULATION

[Reading time one minute]

A Watchword with the Accent on the *Watch*

When Electric Railway leaders advocated "Modernization," some roads considered it merely a watchword with the accent on the *watch*.

They watch the properties which are now operating modern cars. They watch their increase in revenue. They watch their decrease in expense.

Modernization, however, was intended as a spur to definite action rather than a policy of "watchful waiting," and roads which adopt this active program have the satisfaction of watching their own results. As a first step in this direction—

TREADLE-IZE

—and watch for a definite increase in operating speed and traffic volume with a definite decrease in operating cost.

NP

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

Wilmington's New Cars



are "modern" in every sense of the word. A unique painting scheme, both exterior and interior illumination, and every detail of design have been developed by the company to meet the new demand for improved appearance, comfort, safety and convenience.

the car, another factor responsible for the rapid acceleration and retardation rates possible. Variable load brakes also were used.

Westinghouse Variable Load Brakes *are* modern! They are in keeping with other up-to-date improvements . . . Uniformly short stops throughout range of car loading insure safer operation, permit cars to hold their place in the traffic stream, and assure a general speeding up of schedules. . . . The Delaware Electric Power Company is one of many traction properties that are realizing the benefits of this most modern type of brake. Use it on *your* new car and profit likewise.

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES

BETTER MAGAZINES

Through Co-ordinated Publishing Facilities

DURING THE LATTER HALF OF 1928 the McGraw-Hill Publishing Company took two important steps in the development of its program of expansion. Through mergers with the A. W. Shaw Company and the Textile World organization three new magazines were added to the McGraw-Hill group, making 24 in all.

In their entirety these publications now cover the five major branches of engineering—civil, electrical, mechanical, mining and chemical—and the industries allied with them. They embrace also two divisions of the field of transportation, the electrical and radio trades, the food and textile industries. In addition they serve the interests of production management and service-to-production in all manufacturing industries. And, finally, they enter the broad field of commerce, business and finance.

The effect of this continuous evolution of the McGraw-Hill program has been to expand steadily the gathering and dissemination of business news, to insure the recording of all important industrial developments, to provide authoritative interpretation of events, and to strengthen the activities of each publication through internal co-ordination and co-operation. Publishing facilities for the group as a whole have been enhanced beyond those which any single paper or lesser group might enjoy, and these advantages have found expression in better publishing media for the service of American business and industry.

The spirit animating this co-ordination of related publishing activities is a response to the increasingly severe and exacting demands upon business publishers. It springs from a recognition not only of the desire but also of the necessity for broadening and strengthening the service of the publications to their respective fields. It is in harmony with the spirit of progress and growth so characteristic of industry and business in this country. It is broader than the mere desire to be in step with business tendencies. The business press, if it is not to lag in the leadership it has attained in the past two decades, cannot rest on its record of performance. It must keep a step in advance, must have the forward look.

Advantages of Co-ordination

DOES IT REQUIRE publishing experience to see the value of co-ordinating publishing facilities? The co-ordinated organization can throw a drag-net over the industrial, engineering and business world; it has the personnel and the facilities for covering all new events, ideas and developments. Today, on the McGraw-Hill publications there are 128 editors specializing in interpretative, creative, technical, commercial and research writing or investigation. Each paper has its own independent staff and is served, in turn, by an effective news-collecting agency, which has the needs of every staff in mind and which knows the interests of the readers of each publication. At the same time each individual publishing staff naturally stimulates and supplements the others through exchange of information from different fields of business and industry.

Thus the collection of data on new developments is broader and its interpretation more authoritative. The leadership of the papers along the avenues of sound progress is surer and more aggressive.

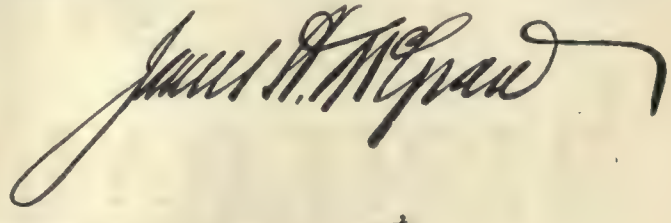
This has been our experience with the entry of every new paper into our group. Just now we expect a particularly great stimulus within the organization from our association with *The Magazine of Business*. For all the other McGraw-Hill publications *The Magazine of Business* now forms a capstone.

It is in truth a magazine of American business, for it serves the policy-forming executives in all branches—in trade, industry and finance, and in all of the servicing branches, such as transportation, communication, power, insurance and warehousing. It goes to many men who already read McGraw-Hill and other industrial papers. It in no sense replaces them. It talks to specialists, not as the industrial paper does, in terms of their specialties, but in the broader terms of those factors which affect all business from without. It will, therefore, bring to each McGraw-Hill publishing staff a broader sounding of the whole stream of business. At the same time *The Magazine of Business* will draw upon all of these editors for an intimate understanding of the flow of business, as these 128 trained observers see it from day to day in their visits and correspondence with thousands of business men, engineers and industrialists in specific industries. The help of these editors will be all the more valuable because of their intimate contact with science and engineering which are the bases on which modern industry and business are built.

A Great Responsibility

IT IS IN THESE WAYS that, through improved editorial service, the public benefits from the co-ordination of publishing facilities. There are returns to the public, too, through co-ordinated advertising and circulation activities; through economies in production, in purchasing, in administration. All of these enable more money to be spent on the primary service—that of building a better editorial service for the reader.

We are fully conscious that our magazines are an important and direct avenue to the minds of America's business men, her industrialists, and her engineers. Apart from any wish of publisher or reader, such an avenue is bound to create business and industrial opinion and, therefore, affects American business, and, indirectly, the whole American public. Ours is a responsibility of which we are keenly aware. We propose conscientiously to discharge it in the interests of business and the public.



This N.Y.C. substation

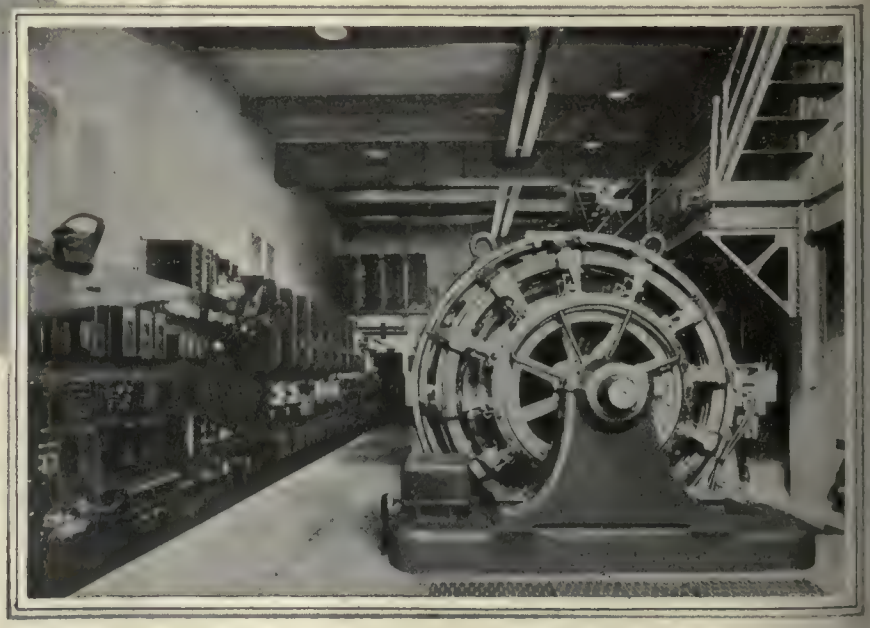
may be operated by either automatic or remote control



The completion of the new Harmon unit marks another step in the extension of the automatic substation equipment of the New York terminal electrification of the New York Central. With the addition of the two automatic stations now under construction at Hastings and Phillipse Manor, the system will include one of the largest groups of automatic substations on class 1 railroads in the United States.

This G-E equipped substation, like previous installations, can be operated automatically or by remote control from the master station at Ossining.

The economy and reliability of General Electric automatic control and switching equipment, demonstrated on this electrification for many years, is responsible for the exclusive use of G-E equipment in the new stations.



130-14

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
James H. McGraw, *Chairman of the Board*
Malcolm Muir, *President*
H. C. Parmelee, *Editorial Director*

CHARLES GORDON, *Editor*

Louis F. Stoll, *Publishing Director*

Volume 73 — *New York, Saturday, January 19, 1929* — *Number 3*

Home Manufacture Frequently Is Self-Delusion

IT IS altogether or entirely natural that many improved devcies for electric railway maintenance originate with the men who do the repair work. These men, being in close contact with daily maintenance procedure, appreciate the need for better tools and equipment. Many of the ideas that originate in the shop are eventually taken up by manufacturers and developed for general use by the industry. Others, however, are suitable only for the local conditions in a particular shop or on a particular property, and do not have wide enough application to warrant commercial development.

Recently, a large operating company, in providing equipment for a newly constructed shop, was confronted with the problem of developing many special shop fixtures which could not be obtained readily in the open market. Included in the list were armature racks and trucks, axle racks, tool racks, special storage bins and cabinets, work and welding benches, equipment overhauling stands, chemical cleaning tanks, etc. As the railway had a new shop, well equipped with modern machinery, there was the natural temptation to go ahead with the manufacture of the new fixtures. This company, however, first made drawings and sketches of the equipment needed. These were submitted to several manufacturers with a request for prices on the finished products. At the same time, estimates were made of costs to build the equipment in the railway shops. It was found that manufacturers were willing to build the needed devices at a cost considerably below that estimated for home manufacture.

This company decided that inexperienced men working with more or less makeshift machinery could not be expected to compete with manufacturers properly equipped for this class of work. Furthermore, the management was frank enough with itself to admit that special fixtures produced in its own shop under conditions of inadequate personnel, machines and inspection, would probably be inferior to the product of experienced manufacturers, and would cost more in the long run. Subsequent results proved that these conclusions were sound. Not only was the price lower, but the quality and finish of the final product proved to be superior to that which could have been expected had the work been done in the company's own shop.

The general question of home manufacture has received much discussion from many angles. All too frequently, the mechanical man with a penchant for manufacturing includes only direct labor and material in estimating costs. The important items of overhead, including power, heat, rent, taxes and particularly supervision, are frequently overlooked. When this is done, it is, of course, obvious that the master mechanic is merely misleading himself or his superiors into the belief that he is "beating the game."

But in many instances there is another explanation for the prevalence of the practice of "home making" inferior equipment at excessive cost. Due to a policy of false economy enforced by their superiors, the mechanical men on many properties find it impossible to get approval of requisitions for new equipment needed in the shop. Their only recourse is to build this equipment themselves, even though the cost may be high and the final product crude. The transaction does not go to the boss for an appropriation. The materials are frequently picked out of the scrap heap, and the labor is charged to routine maintenance. If the boss should happen to see the final job, he is likely to compliment the mechanical man for his ingenuity and economy. When this occurs, it is the management, not the master mechanic, that is at fault.

Maintenance Budget Figures Show Favorable Trends

CLOSE analysis of the expenditures made by electric railways during the year 1928 for maintenance materials and labor reveals some encouraging trends. The total decreased $13,351,000 during the past year in comparison with 1927. This was accounted for in the very large recession in the way and structures item, which, in turn, was lowered by the increased activity in track reconstruction not chargeable to maintenance account.

It is significant that the expenditures for both car and bus maintenance increased during the year, the car figure by $2,607,000 and the bus figure by $10,867,000. Further increases for both of these accounts are forecast for 1929, the increase for car maintenance being estimated at $1,400,000. Also, the way and structures maintenance account, which receded $26,000,000 during 1928, is expected to increase more than $10,000,000 during 1929, according to the estimate. This, of course, is based upon indications that operating properties that have been concentrating on the reconstruction of bad track, during the coming year, will give increased attention to the maintenance of existing track that is still in fair condition.

During the past three or four years the maintenance situation was rather distressing. Companies faced with decreasing revenue and increasing operating expenses cut wherever possible and the maintenance department suffered in the general move. That this was carried to a dangerous point is indicated by the decreases in expenditures for maintenance materials during the years 1926 and 1927, when the figures receded $25,000,000 and $21,500,000, respectively. Part of the large decrease in the car maintenance figures can be attributed to the in-

This is the issue in January that is devoted essentially to maintenance and construction subjects

creased interest in the bus, with consequent neglect of cars. Now that the uncertain period seems to have passed operators are awakening to the importance of keeping all of their equipment in proper condition and are spending more for this purpose. The estimated increase for the present year is not large, being less than $1,000,000, but it is sufficiently large to show that operators are becoming aware of the need for better maintenance.

A large increase in the bus maintenance figure for 1928 was to be expected with the increase in the number of buses, but the actual figure exceeded preliminary estimates. The increase in material alone amounted to $5,590,000, while the total of material and labor for the year reached $10,867,000 above 1927. The steadily increasing number of buses in use and the growing average of the vehicles in service are accountable for the increases in maintenance expenditures which have occurred every year since the bus was first used intensively by electric railways. Another increase is forecast for 1929, totaling almost $2,000,000 above 1928.

The budget data gathered each year serve to show the trends in each maintenance department and when studied over a period of years reveal whether the standards are being raised or lowered. It is a good omen that the figures for 1928 and 1929 show favorable trends and that electric railways are planning to spend more for this important phase of operation in the future.

Pedestrian Regulation Needed

MUCH has been said in recent traffic discussions concerning the necessity for expediting the movement of mass transportation vehicles. Because these vehicles carry about 75 per cent of all the people who ride, interference with their progress is the most serious form of traffic delay. It must be remembered, however, that no small part of the delay to the 75 per cent who ride is occasioned by the same 75 per cent when they are on the streets as pedestrians. At any intersection in the congested district, at any hour, pedestrians may be observed occupying a portion of the roadway when vehicular traffic has the signal to go. This not only reduces the street area available for moving traffic, but also causes the traffic to move considerably slower. The progress of all vehicles is hampered and much unnecessary delay results.

Before blaming the pedestrian for his annoying behavior, however, we should consider the cause of it. The fact is that many pedestrians cross streets at the wrong time because there is no right time. Having a legal right-of-way avails them nothing. Often when the pedestrian is crossing in the same direction as the movement of traffic, his progress is seriously hampered by vehicles making right-hand and left-hand turns. In some respects this danger is more difficult to guard against than the danger from vehicles going straight. Seldom does the pedestrian have an opportunity to cross the street entirely free from interference. Hence, pedestrians have generally adopted the policy of crossing when and where they can regardless of signals—each one for himself and the devil take the hind-most.

That this creates a bad condition is easily seen, but it is not so easy to suggest a remedy. If it were possible to establish periods for pedestrians only in the cycle of the traffic lights, this might solve the problem. At busy intersections, however, the volume of vehicular traffic is so great that it is impracticable to establish even short periods when all vehicles are stopped. Overhead crossings and subways for pedestrians have been tried in a number of places. They have not proved popular; probably because the pedestrian feels that his rights on the street antedate those of the automobile and that he should not be discommoded for the sake of wheel traffic.

Pedestrian control also has been tried in a number of places. Results have not been particularly encouraging. In general, it has been found that pedestrians obey the lights only when there is a policeman on hand to compel obedience. A campaign of education is needed to teach the pedestrian that regulation of his movements at street intersections is to his own advantage. It is probable, also, that the length of the traffic cycle has a considerable influance on the tendency of pedestrians to cross against signals. For the success of any plan of pedestrian regulation, it will be necessary that the walker be given a reasonable opportunity to cross streets free from interference of vehicular traffic. This phase of the traffic problem is one which mertis greater attention than it has received.

Wide Variety of Maintenance Problems

JANUARY 15 was the closing date for material submitted in ELECTRIC RAILWAY JOURNAL's maintenance contest for the first group of departmental prizes. Nearly 100 items were received. Of these 65 per cent describe practices and equipment in the rolling stock and shop divisions, 20 per cent of the entries were from the way and structure department, 10 per cent were items on bus and garage practice and 5 per cent presented practices in the electric and line departments. A meeting of the committee of judges is scheduled early next week, and winners of the first series of four department prizes will be announced in the Feb. 16 issue of the JOURNAL.

In going over the material submitted in the contest, one is impressed with the particular problems in which these men are interested—the improvements in maintenance practices that are being made and the new tools that are being used to advantage. Of the items relating to rolling stock and shops, more than 30 per cent deal with improved methods that are saving time, labor and money and reducing the number of equipment failures in service. Shop constructed tools for doing special maintenance jobs easily constitute the next largest classification. These represent about 20 per cent of the total. Improved methods of testing and apparatus for testing, small tools, jigs, fixtures and improvements in car equipment each constitute about 10 per cent. Other items cover methods for increasing the efficiency of car equipment, improvements in shop tools, economies resulting from the use of new machine tools and safety precautions that are being taken in the shops.

Articles submitted by way and structure men show that they are concerned particularly with methods for preventing trouble, types of construction to increase track life, improved tools for speeding up work, and the solution of special design and construction problems. Attention is being directed primarily toward reducing the time and cost of track repairs, while at the same time providing better types of construction that will give increased life.

Men connected intimately with bus maintenance seem to be concerned chiefly in improving their inspection practice, overhauling procedure and general maintenance methods and in providing new tools that will assist in doing improved work at minimum cost. Several items describe economies that have resulted from new equip-

ment and new tools that were constructed to do jobs quicker.

Special design and construction problems seem to occupy the attention of line engineers. The items submitted relate particularly to types of construction that are being used to advantage. This brings to light an interesting phase of the maintenance contest. When we think of maintenance work the most general assumption is that this relates to the removal and replacement of worn parts or methods that will increase their life. In the distribution department particularly, life of the overhead is increased by use of improved types of construction. These are usually developed by the men in the field who are in direct contact with daily problems. When a special construction job is encountered, when clearances are close or obstructions are in the way, the men in charge of overhead find a way of mastering the problem. It is just such solutions of special problems that are of particular interest to the distribution maintenance forces of other properties, and these ideas, therefore, predominate in the maintenance contest entries.

Electrification Exceeds Expectations

STEAM railroad electrification has been gaining steadily for the past decade, although in the installations of electric equipment there has not been the spectacular touch that is looked for so eagerly by publicity agents. The review of the subject, appearing in the issue of this paper for Jan. 12, indicates that more than 4,100 miles of track formerly devoted to steam service are now being operated with electric locomotives or motor cars. This, of course, does not include electrifications of the type of the New York and Chicago elevated lines, nor of portions of steam railroad systems sold or leased to trolley companies. Additional projects now under way will increase this mileage approximately 40 per cent. This figure in itself is an indication of the present interest in the subject being taken by railroad men.

The latest addition to the lists of electrified lines is the Great Northern Railway, which began full electric operation of the division through the Cascade Mountains between Skykomish and Wenatchee, in the State of Washington, on Jan. 12. While a portion of the line had been converted for electric service nearly two years ago, the vital link, the new tunnel through the Cascade Mountains, was not completed until a short time ago. Accordingly, the full benefit of the change to electricity is only now being realized.

The Great Northern electrification differs from any other in that it succeeds an electrification put in service through the old Cascade tunnel twenty years ago. Experience with the earlier system had much to do with the decision to extend the electric zone and to build a tunnel for steam service as long as the new one. The new installation, extending over the mountains, will make possible a material increase in capacity of freight trains that can be hauled on the system, and will reduce the running time by several hours. In addition, there will be material savings in the cost of operation that will make the new system pay a good return on the investment.

Experiences with electrification show that the success of each one far exceeds expectations. At first it took a long time to convince the railroad operator of the value of electricity as a motive power, but, as more and more installations are made, the evidence becomes stronger. Furthermore, the need for electrification, due to the concentration of traffic and the necessity of handling heavier trains at higher speeds, is becoming greater. It is not too much to anticipate a number of major projects in the next few years in addition to those already announced.

Give Finance the Thought it Deserves

AGREEMENT exists among bankers and others that business may be expected to continue at its present level indefinitely unless factors now unforeseen should suddenly intervene. This is reassuring to men engaged in supplying local transportation since it means that their business will probably remain at its present level, a level none too satisfying to some, but one highly propitious for others. To meet that condition, many of the railways are adequately prepared with equipment and men, even if few of them have exhausted the possibilities which lie in intensive stimulation of the use of the service.

Gradually, of course, ever so gradually, the situation is improving financially, considered in its broadest sense, if not in the sense of increasingly larger net earnings. Some one will arise to say that the net is the real desideratum. And it is. But greater net is to be expected since the prospects for financing at reasonable rates have improved, the amount of bonds in default has been reduced, and maturities are apparently to be cared for as they arise without undue strain.

While the prospects are good for borrowers who must come into the market, it is to be regretted that greater advantage was not taken of the period of easy money to revamp more financial structures along the lines recommended by the committee on finance of the American Association. For some companies to temporize with this situation longer is to compromise with a bad condition, if not almost to invite disaster. Voluntary readjustment is seldom easy to accomplish, but it surely is worth the effort since the prospect is remote of the earnings of some companies ever reaching the point where a return can be realized on all the issues outstanding. Surely the prospect of probable returns should be sufficiently alluring for holders in companies now making little progress to make the effort really worth while. Inventory write off is not unusual in other industries, so why should it be to the electric railway, especially if by such process equipment can be discarded that should long since have been replaced by up-to-date means that assure not only the payment of their own way but of a real profit.

On the whole, there are no disquieting factors in the financial situation. Earnings are not in every case all they should be, but quite as often as this is chargeable to the inadequacy of the rate of fare, is it chargeable to the fact that full advantages have not been taken of the possibilities of intensive use by management and men of facilities at hand or that could be brought to bear on the situation.

It has taken the industry a long while fully to realize the competitive nature of the business in which it is now engaged, but where that change has come to be accepted for what it really means and where anything like an adequate fare has been allowed, the outlook is anything but dark. Supplying local transportation is a business very different from what it was a few years ago, and those have profited most who were sufficiently alert to recognize the change and to adjust themselves to it quickly.

Great Northern Electrification Extended

Opening of new Cascade Tunnel, the longest in the Western Hemisphere, inaugurates 100 per cent electric operation. The line included is between Skykomish and Wenatchee, a distance of 73 miles



One of the Great Northern's 371-ton single-phase locomotives hauling a ten-car passenger train

DRIVING of the new 8-mile Cascade Tunnel and the relocation of lines through Chumstick Creek, on the eastern slope of the Cascade Mountains in the state of Washington, represent only part of the betterments recently completed on the Cascade division of the Great Northern Railway. The electrification of the mountain section of the Cascade division is in itself a development of the greatest importance. Train operation through the 8-mile tunnel on the 1.5 per cent grade, without the addition of artificial ventilation, would be impossible without electric motive power. Electrification of such a tunnel is, of course, imperative, and with the electrification of the tunnel its extension to the limits of the heavy grade sections approaching the tunnel followed as a matter of progressive policy.

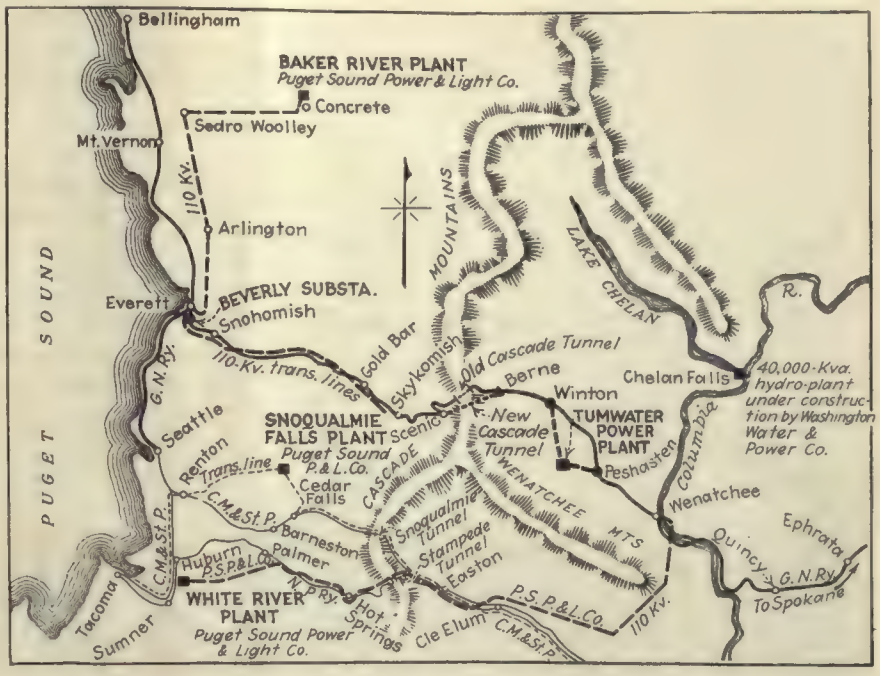
The Great Northern Railway was a pioneer in heavy electric traction. In 1909 it electrified the original 2¾-mile Cascade tunnel extending between Tye and Cascade. This electrification consisted of a three-phase contact system from which two trolley pole collectors fed three-phase locomotives. The 6,600-volt contact system consisted of two direct-suspended trolley wires and the rail. This was the only installation of three-phase traction of any moment ever made in America.

In 1926 the Great Northern decided to extend its electrification to Skykomish at the western base of the Cascade grade. The railway management, in view of its experience with the high voltage, three-phase system and with the desire of obtaining the advantages of high-voltage power transmission on the contact system, together with the excellent characteristics of the d.c. motor for freight drag service on the heavy grade, specified an 11,000-volt single-phase contact line to be used with motor-generator type locomotives. The Great Northern today is the largest user of this type of locomotive, and, in view of its two years of experience with

motor-generator engines in operation between Skykomish and Cascade, it is interesting to note the layout and characteristics of the system, together with some of the operating results obtained to date.

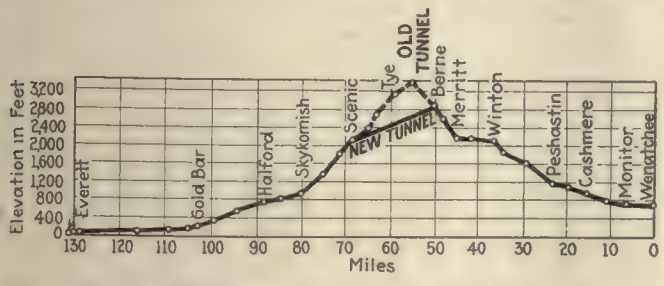
POWER OBTAINED FROM THREE SOURCES

Power for this 73-mile electrification is obtained both from the Puget Sound Light & Power Company's network and from the original power plant at Tumwater which supplied the 25-cycle, three-phase current to the old tunnel. The map of the electrified section and the line diagram show the sources and arrangement of power supply. The Puget Sound, 110-kv., 60-cycle, three-phase lines feed frequency changer stations at Skykomish and Wenatchee. The 60-cycle energy is converted by 7,500-kva. frequency changers, one in each station, to 25-cycle single-phase power. This is transmitted through two single-phase, 44-kv. circuits extending between Skykomish and Wenatchee. The Tumwater hydro-electric plant is connected to this 44-kv. line and feeds in 5,000 kva. to the system. The nominal total power capacity of the machines connected to the electrified section is therefore 20,000 kva. It is interesting to note that the original 25-cycle, three-phase generators at Tumwater are now supplying 25-cycle, single-phase power.



The electrified section of the Great Northern extends from Skykomish to Wenatchee. The sources of power also are shown

There are seven distribution stations which convert the 44-kv. power to 11,000-volt, supplying the trolley-rail circuit. These stations are shown on the line diagram and are located on an average approximately 10 miles apart. The total capacity of the converting transformers, including part of the three-winding transformers at Skykomish and Wenatchee, is approximately 30,000 kva. The distribution system is extremely simple in its layout, and each of the transformer stations is controlled from a station agent's office, and the stations have been arranged with a view to such control. All oil circuit breakers at the transformer and main substations are electrically operated, and are arranged for full automatic relay protection. The distribution transformers are all arranged with Inert-Aire equipment. From the capacity of the converting and distribution stations, it may be seen that the Great Northern is placing itself in an excellent position with regard to future possible increases in freight train size, with the accompanying increases in local power demand. A typical distribution station is shown in one of the views. The equipment is installed outdoors, while the station building may be seen at the rear.



The profile shows the severe grades on the electrified section, and the relief obtained with the new tunnel. The total distance on the electric division is now 8 miles shorter than that shown

SIMPLE CATENARY CONTACT SYSTEM USED

The success of the initial contact system between Cascade and Skykomish, where there is an unusual amount of curvature, much of which is 10 deg., has demonstrated the many economic advantages and satisfactory operating qualities of the simple inclined catenary system as installed.

The system used comprises a No. 0000 cadmium-bronze contact wire, supported by a composite messenger consisting of a bronze high-strength core surrounded by pure copper strand. The total equivalent conductivity is approximately 400,000 circ.mil. Hanger fittings and clamps to the messenger and contact wires are non-ferrous. On tangent track the contact wire is supported by flexible loop hangers, the messenger and contact wire being well bonded at 300-ft. intervals. On curved track up to 3½ deg., pure inclined catenary is employed which permits the elimination of all pull-off devices other than the hanger supports. On curves of shorter radius pull-off yokes are installed at the supporting poles, such curves employing arcs of 3½ deg. curvature with a maximum offset of 6 in.

On tangent track 150-ft. pole spacing is standard where the 44-kv. circuits are carried. The pole spacing between Winton and Leavenworth, where the transmission lines are not carried, is 180 ft. On curved track the pole spacing is reduced on curves sharper than 6 deg. to suit a 6-in. maximum offset of the contact wire. Where possible the contact wire height from the rail is retained at 24 ft. Through tunnels, and the limited number of snow sheds now existing, this height is considerably reduced.

Three standard Westinghouse insulators are employed to support the messenger on curves and on cross-span construction. Pin insulators were extensively used with the 44-kv. transmission circuit. In the construction of the new 8-mile tunnel provision was made by means of



One of the distribution stations on the Great Northern electrification

inserts at 75-ft. intervals to provide ample suspension insulator clearance, so that, if necessary, a contact voltage of 22,000 eventually might be employed. By means of the inserts, maximum insulating distances are obtained without encroaching on the loading clearance of the tunnel. At suitable intervals, longitudinal troughs have been arranged in the tunnel for anchoring the messenger and contact wires so as to limit as much as possible any disarrangement of the catenary system.

The tensions in the contact and catenary wires are so related that, with inclined catenary, all hangers are parallel. It is interesting to note that on the 16 miles of line extending between Winton and Peshastin, where there is considerable curved track of 3 deg. or less and where the structure spacing is practically uniform, there are no steady or pull-off devices attached to the contact wire on the main line.

Motor-Generator Locomotives Perform Well

The success obtained to date with this comparatively extensive application of the motor-generator type locomotive is the most interesting part of the electrification. These locomotives were described in this paper, issue of July 9, 1927, page 53. It is of interest to review briefly the two years of performance of the first two locomotives delivered to the Great Northern Railway by the Westinghouse Company early in 1927.

The single-phase contact system in the first instance extended between Skykomish and Cascade through the old 2¾-mile Cascade tunnel. The change from the 6,600-volt, three-phase contact system to the 11,000-volt single-phase contact system was made on March 5, 1927. Since that date all operation of trains over this limited length of track has been made with the motor-generator locomotives. The first two locomotives delivered maintained practically the entire service for nine months, and, in the first twelve months of operation, each locomotive covered more than 50,000 miles on the 2.2 per cent compensated grade. To date, these locomotives are approaching their 100,000-mile mark, and when the condition of grade and limited speed on this section is taken into consideration, it will be appreciated that this is a very creditable performance for a comparatively new type of locomotive in this exacting service.

With the extension of the electrification to Wenatchee, it becomes possible to exploit more fully the many inherent advantages of this type of locomotive. On the west slope of the mountain, the grade, as may be noted from the profile, consists of a steady 2.2 per cent (compensated) rise from Skykomish to Scenic. Through the new tunnel the grade is 1.56 per cent for 8 miles.



Catenary construction on curve with transmission line

On the east slope the grades consist of 2.2 per cent and 0.2 to 0.4 per cent, and a considerable stretch of track averaging approximately 1.3 per cent. With these varying grades, the advantages of being able to operate the locomotives at a constant horsepower output are apparent, both in the matter of the schedule speeds which can be obtained with limited maximum speeds, and in the matter of the maximum power demand resulting from a given schedule speed.

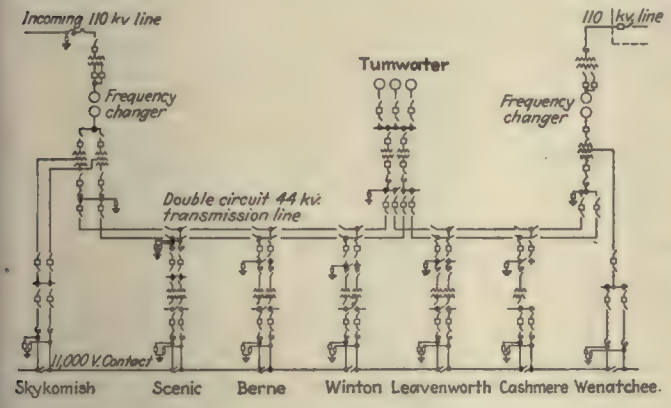
A locomotive starting at Wenatchee can, in either freight or passenger service, develop its rated horsepower on all grades exceeding 0.7 per cent. To obtain this desirable result, refinements in the control have been incorporated in these locomotives, which are of special interest. The locomotives can be operated with either

CHARACTERISTICS OF LATEST GREAT NORTHERN RAILWAY SINGLE-PHASE LOCOMOTIVES

Total weight	*742,200 lb.
Classification of wheels	1-D-1 = 1-D-1
Weight on drivers	569,600 lb.
Number of driving axles	8
Number of idle axles	4
Capacity at one-hour rating	4,330 hp.
Starting tractive effort, 25 per cent adhesion	142,000 lb.
Maximum starting tractive effort, 33⅓ per cent adhesion, limited by adhesion	189,000 lb.
Tractive effort—hourly rating	112,500 lb.
Speed—hourly rating	14.4 m.p.h
Tractive effort—continuous rating	88,500 lb.
Speed—continuous rating	15.5 m.p.h
Maximum speed	*45 m.p.h
Track gage	4 ft. 8½ in
Total wheelbase	62 ft. 10 in
Rigid wheelbase	16 ft. 9 in
Length over all (between faces of buffers)	94 ft. 4 in
Width over all	11 ft. 0 in
Height from rail to locked position of pantograph	15 ft. 10 in
Diameter of driving wheels	56 in.
Voltage and type of conductor	11,000-volt, 1-phase, 25-cycle, overhead
Number and type of motors	16—type 356A
Method of drive	Double flexible gear
Gear ratio	18:91
Number of this type of locomotive in service	5
Type of control	HBFR
Year placed in service	Two, 1927; two, 1928

*These figures for locomotives 5000-5001, 5002-A, 5002-B, 5007-A, 5007-B.

a series characteristic such as that of the conventional d.c. motor, or as separately excited motors with either a constant speed characteristic or a constant horse-power characteristic. These varying characteristics are obtained through a closed circuit transition which permits of



A single-line diagram of the power distribution on the Great Northern electrification

alteration in the circuits without any change in tractive effort or speed during the period of transition. The accompanying table represents the general weights, dimensions and rating of these locomotives.

CHARACTERISTICS OF LOCOMOTIVES CHOSEN FOR SEVERE GRADES

The locomotive units, which may be assembled to operate two or more in multiple, are each rated to haul continuously 700 tons trailing load on a 2.2 per cent grade. At present, the customary arrangement is a locomotive made up of two units. Two such locomotives can take a 2,900-ton train either east or west on the 2.2 per cent grade approaching the tunnel. Two to four full-tonnage eastbound freight trains are handled per day, with somewhat lighter trains westbound.

Normally, three through passenger trains go east and west per day, with many extra trains during the tourist season, and occasional express trains with silk shipments from the Far East. Each passenger train will have an



Cross-span construction on Great Northern electrification

automatic train-heating tender attached to the locomotive. The maximum weight of a passenger train will exceed 1,000 tons.

The locomotives described can be interchanged readily between passenger and freight service, and, although predominantly drag freight engines, they can perform a very creditable schedule in passenger service. For local service on this division a 50-ton locomotive and an electric motor car are being equipped.

The maximum power demand with one freight train is approximately 7,500 kw. This load may be increased to 9,500 kw., and it is expected to keep the maximum power demand for the system to approximately 13,000 kw. under present conditions of traffic. The local power demand of a 3,500-ton freight train will be 9,500 kw. This may be increased to 11,500 kw. with a 4,200-ton train, and the distribution system is laid out to handle even heavier loads economically when the railway management requires it.

The electrification as installed provides for the unrestricted development of railway operation on this important division, both in the matter of freight train size and speed and in the speed of passenger trains. The distribution scheme can also be readily adapted to further extensions of the electrification. With power supply from three independent sources the continuity of service is assured.

For this electrification the Westinghouse Electric & Manufacturing Company has furnished ten locomotive motive power units, the last two of which will be delivered in January; primary requisites of the distribution system, including transformers and switchgear; and important features of the overhead contact system.

Methods Used in

BABBITTING BEARINGS

Have Marked Effect on Lubrication

By H. L. Kauffman
Denver, Col.

In an article in the Oct. 20, 1928, issue of ELECTRIC RAILWAY JOURNAL, *the author discussed the kinds and grades of lubricants suitable for use on electric railway equipment; kind of waste preferable for use; how to saturate the waste with oil; and modern practice in packing the "down-feed" motor. In a second article in the Nov. 17, 1928, issue data were given on modern-type motor lubrication; modern bearing oiling devices and causes of bearing lubrication troubles.*

The present article contains information on electric railway journal lubrication; on linings and lining metals and the rebabbitting of bearings; and proper methods of lubricating gears and pinions.

JOURNAL boxes of electric railway cars are packed with oil-saturated waste, like that used in the lubrication of motor bearings. Some companies, upon finding the waste in the journal box to be dry, merely add more oil to the waste already present; others repack with freshly saturated waste. The latter procedure is recommended since it insures proper oil distribution and, therefore, is the more efficient and economical practice.

Journal boxes should be packed by inserting a rope of saturated waste, which will reach around the bottom half of the journal. Then, this waste should be pushed tightly against the back of the box to insure lubrication of the fillet and the exclusion of any dirt, dust, etc., that might enter through the back of the box. Pieces of waste as large as possible—one piece only, if the design of the box permits—are then used in filling the remainder of the box. If only one piece of waste is used, it should be fed in gradually rather than in a ball. By following this precaution jamming, which would allow voids in the waste, will be prevented.

The waste should not be placed above the center line of the journal. By keeping the waste packed below the center line of the journal, dragging of the waste into the bearing is prevented.

Where track conditions are such as to cause the waste to work toward the front of the box, a good practice to follow is to twist the waste under the axle button. A box using a thrust plate between the box and the brass aids in keeping the waste in position, due to the fact that such a plate takes a large part of the lateral sliding motion. In applying new brasses and check plates, it has been found advantageous to smear the rubbing parts with oil before putting them in place.

Practice varies as to the length of time allowed to elapse before journals are oiled or repacked, much depending upon local conditions. One company whose tracks are very smooth, with few curves and with a relatively low equipment speed, packs journals only once a year; another punches up the waste to the axle after each 1,000 miles of operation and repacks with freshly saturated waste at the end of each 5,000 miles. Naturally, whenever journals are immersed in water as a result of flooding the streets by a storm, immediately thereafter the packing must be removed and replaced with new. Here, let it be emphasized that for efficiency in journal lubrication it is absolutely essential that dust-guards and journal-box covers be kept in prime condition in order to exclude dirt and water from the journal.

A novel oiling can is available for applying and measuring the quantity of free oil put into a journal. This can has an adjustable push handle, each stroke of which delivers a measured amount of oil through a perforated nozzle which, in turn, distributes the oil along the entire length of the journal. Several patented journal oiling devices are on the market, but information as to the success with which these devices are functioning is not available to the writer.

In so far as fit is concerned, tapered journals should not be tolerated, since such journals reduce the bearing areas and increase bearing pressures. When a brass has to be fitted to a badly tapered axle, often anchor holes are drilled in the face of the brass and then solder or some similar metal that will seat readily in service is run in. When this practice is followed, the anchor holes should be drilled well away from the center of the brass and the drill limited to $\frac{3}{8}$ in.

Confusion arises when brasses of different diameters are carried in stock. When the proper brass is fitted to the proper journal, the life of the brass is increased so as to more than compensate for the care required in keeping the brasses separate. It is self-evident that brasses that bear only on a line at the top center of the journal or on two lines at the edge will not be in service for any great length of time.

Linings and lining metals are closely related to the matter of lubrication. The armature linings are carried in motor housings which have waste pockets and drain pockets. The standard armature lining consists of a bronze shell, lined with babbitt and keyed in the housing. The babbitt is of such thickness that should the metal melt and run, due to accidental overheating, the armature is prevented from striking the pole pieces by the bronze shell and the armature shaft bearing surfaces are protected from injury. The linings are provided with an opening on one side to allow the oily waste in the

pockets to come in contact with the bearing surface of the shaft.

The axle linings of a railway motor are generally of bronze for maximum axle sizes, but malleable iron lined with babbitt is sometimes used for smaller diameters of axle. The two halves are prevented from turning by a clamp fit and are either keyed or doweled. An opening provided in the lining on the low pressure side allows the oily waste in the bearing pockets to come in contact with the axle.

The edges of the openings in the linings are chamfered to assist oil in entering the bearing, and grooves are provided to insure the passage of oil from the bearing surface to the flange which must take the thrust. Every precaution is taken to exclude dirt from the bearings. The bearings are of ample size and with proper care and lubrication should give long life.

The material used for lining shells must offer the best bearing surface with the least amount of friction and have sufficient strength and ductility to withstand the severe operating conditions of railway service. The alloy used for brass or bronze shells is composed of copper, tin, zinc, and lead, the proportions of which have been determined after many years of exacting and exhaustive tests.

Alloy No. 4 is the equipment standard preferred by many railways for replacements on account of its general recognition as the highest grade bearing alloy obtainable. Alloy No. 80 has been standardized for replacements by many large operating companies and gives nearly as good service as Alloy No. 4 at a considerable reduction in cost.

The composition of these alloys is as follows:

Material	Alloy No. 4	Alloy No. 80
Copper	84.0 per cent	78.0 per cent
Lead	0.5	16.0
Tin	12.0	4.0
Zinc	3.5	2.0

Brass and babbitt linings are now almost universally used for armature bearings. This type is preferred to the straight bronze type for the following reasons:

1. A rough or uneven surface due to imperfect machining which might be barely detected will quickly wear out of the babbitt, thereby presenting a perfectly smooth bearing surface.
2. When grit or any cutting substance becomes lodged between the shaft and bearings, it imbeds in the babbitt without injury to the shaft, whereas in the bronze bearing, the grit powders and acts as an abrasive lap on both shaft and bearing.
3. All types of linings will run hot on either armature shaft or axle if not properly lubricated. When this trouble develops, the shaft is seldom damaged by the babbitt bearing. In fact, many cases have been noted where the babbitt after running hot and melting or becoming scored on the bearing surface took on a smooth glazed surface by the application of sufficient lubricant without causing the least damage to the shaft. Under similar conditions, the bronze unlined bearings were ruined and invariably damaged the bearing surface of the armature shaft.
4. The babbitt can be held more securely in a brass shell than in an iron shell, for the babbitt can be sweated in the brass in addition to being anchored by the usual dovetailed grooves. This permits the use of a very thin liner of babbitt or a thickness slightly less than the air gap between the armature and pole pieces. Therefore, in case the lining runs hot and the babbitt melts, the armature can not rub on the pole pieces without first wearing into the brass shell.

Cast or malleable iron shells lined with babbitt have been used quite extensively in old type motors. Where provision is made in a bearing for various sizes of shafts, it is customary to use bronze linings, either babbitt lined or merely tinned for maximum shaft sizes. For the smaller shaft sizes, where more bearing metal is required, malleable iron shells with a thick layer of babbitt cost much less than a straight bronze shell. It is standard practice to use bronze linings for axle bearings except where the thickness of the shell would exceed $\frac{5}{8}$ in., in which case malleable iron and babbitt are used.

Rebabbitting Bearings

In rebabbitting bearings, the bearing shell should be first rough bored, the dovetailed anchored grooves slotted and the grooves in each end turned. The bearing lining should be cleaned thoroughly, by removing all of the old babbitt and any foreign matter, to obtain a clean, bright surface to which the babbitt will adhere. After cleaning, brass linings should be tinned in a bath of half and half solder (melting point 178 deg. C.) and the babbitt poured while still hot from the tin bath. The best results are obtained by pre-heating the shell and jig to a high temperature nearly equal to that of the babbitt. The latter will then flow freely into anchored grooves and adhere firmly to the tin surface. The babbitt shell is then ready to be bored and reamed to size and finished outside.

Babbitt should be heated to a temperature of 500 to 550 deg. C., but to not more than 550 deg. or decomposition of the alloy will take place. The dross which rises to the top of the metal should be cleaned off with a ladle before dipping the babbitt from the kettle.

When pouring armature linings, new metal should be used. Under no circumstances should babbitt from old linings be mixed in the pot with the new metal. Babbitt melted from old linings may be used for journal or axle bearings.

A rough estimate of the temperature of the babbitt may be made by dipping a pine stick in the pot. If the metal is hot enough to be poured, it will set fire to the stick. However, the most reliable method is to determine the temperature with a pyrometer. When babbitting iron shells, it is essential that all of the inner surfaces to which the babbitt must adhere are cleaned thoroughly. Dovetailed grooves are provided in the flange as well as in the body of the shell to anchor the babbitt. Shells should be heated to the temperature of the babbitt and then placed in jigs for pouring the babbitt.

The babbitt used in General Electric railway motor bearings has a tin base composition, the proportions being $83\frac{1}{3}$ per cent tin, $8\frac{1}{3}$ per cent copper and $8\frac{1}{3}$ per cent antimony. This is known as Alloy No. 17. This alloy is the result of exhaustive tests over a period of many years.

Gear and Pinion Lubrication

On the average, trolley car gears and pinions are subjected to unusually hard wear. This is due either to the jerky operation of the car at starting or to the changing of motors from series to parallel. In addition to the objectionable noise feature of gear clashing, excessive wear—especially on the teeth of such gearing—will tend to shorten their period of usefulness and will make expensive replacements necessary. Too much wear of the gears have a detrimental effect on the life of the armature bearings, especially on the gear side, which condition subsequently may result in serious damage to the armature and field windings.

In order to prevent clashing and grinding of the gears, it is essential that the gears mounted on the axle, meshed with the pinion on the driving-motor armature shaft, be coated with a lubricant that will insure against excessive wear.

In the modern motor the gear and pinion are enclosed in a metal gear case. The purpose of this case is to

retain the gear lubricant and to keep out any foreign matter that would tend to cause abnormal gear wear or would interfere with perfect contact of the teeth. In a few instances, some railway equipment is in operation in which the gears are unprotected by a gear case, and are exposed to dust, dirt, etc.

In giving consideration to the selection of a gear lubricant, the following points should be considered: (1) Ease of application, (2) amount required for initial lubrication, (3) amount required for subsequent lubrication, and (4) length of time product will lubricate efficiently. A lubricant meeting these requirements will reduce labor costs and other cost incidental to the maintenance of this type of equipment, as well as increase their life.

While special conditions may warrant alteration, ordinarily a sticky, adhesive mineral oil made from an asphalt-base crude oil, having a Saybolt universal viscosity of about 2,000 seconds at 210 deg. F. is a suitable lubricant for application to gears in winter; and one having a viscosity of about 5,000 seconds at 210 deg. F. for use in summer.

Locality of operation and the maximum seasonal changes in temperature have much to do with the grade of gear lubricant used, since it is of utmost importance that uniform results be secured throughout the entire year from the particular product employed. Consequently, where widely differing maximum and minimum temperatures are encountered, it is sometimes necessary to use special grades of lubricants in accordance with the season and temperature of operation. If a lubricant too thin for the service be used it will result either in leakage from the gear case or undue splashing therein or, if the gears are exposed, dripping therefrom. On the other hand, the use of too heavy a lubricant is apt to result in its settling in a semi-solid mass on the bottom of the gear case, in consequence of which the gears will likely merely "channel" through the lubricant without being properly lubricated. In general, the aim should be to select a lubricant, the viscosity of which in use will be the same the year round and, naturally, such as will cushion the gears properly.

So far as the quality of the gear lubricant itself is concerned, for best results, it should be entirely free from acids or alkalies that would tend to cause any pitting of the highly polished metallic surfaces; should not tend to hold in suspension dirt and particles of worn metal that would produce an abrasive effect; should not harden or contain any residual matter of a non-lubricating character; should not be abnormally affected by heat or be reacted upon by water, acid or alkali; should possess marked adhesive properties, in order that it will neither drip nor flow excessively under abnormal temperature rise, and should not be rubbed off in operation or thrown off by the action of centrifugal force. The lubricant should be of sufficient body to withstand satisfactorily the high pressure at the point of tooth contact, thereby preventing any actual metal to metal contact regardless of the season of the year.

Generally, a gear lubricant of the straight mineral oil type is applied cold by stringing out about ½ lb. or more and feeding it into the mesh of the gears, whereupon the lubricant spreads over the entire tooth surface. More efficient lubrication of the gears is attained by frequent small applications than by a large application at longer intervals, the applications ordinarily being made at car-inspection periods. As would be expected, tight gear cases that exclude dirt and water make renewal of the lubricant necessary less often.

Cement Floor Laid Beneath Loaded Stock Bins

STEEL stock bins in the storeroom at the Kenmore Shops of the Northern Ohio Power & Light Company, Akron, Ohio, were originally placed on an ordinary wood floor. As this floor became worn it was decided to replace it with cement to be laid throughout the entire stockroom so that ladders and trucks could be used to advantage in handling the supplies stored at this point.

Instead of attempting to remove the stock to another location, pending the completion of the new floor, a plan was evolved whereby interruption of the routine of the storekeeping department was kept at a minimum and a considerable saving in time and labor on the job effected.



The bin sections were lifted by using an I-beam over which were looped short chains bolted securely to the bin frames below while a concrete floor was laid beneath

The bin sections are 18½ ft. long and 10 ft. high and with loaded shelves represent weights running into thousands of pounds. The presence of roof girders overhead in the storeroom made it feasible to undertake the elevation of these bin sections a distance above the floor level sufficient to permit the laying of the concrete directly beneath them, rather than going to the trouble of unloading and removing the contents of the bins to other quarters. An I-beam the length of the bin sections was brought into play. Held at short intervals with sections of chain bolted to holes already in the bin frames for adjusting shelf height, this I-beam was in turn secured by chain blocks to the roof girders. With care it was possible to raise each section of shelves without disturbing the supplies stored on them or in any way distorting the bin frames. The cement floor was allowed to harden for two days before the bins were lowered on to it.

Construction Details of

The New Birney Car

By C. O. Birney
Superintendent of Car Construction
Stone & Webster, Inc.

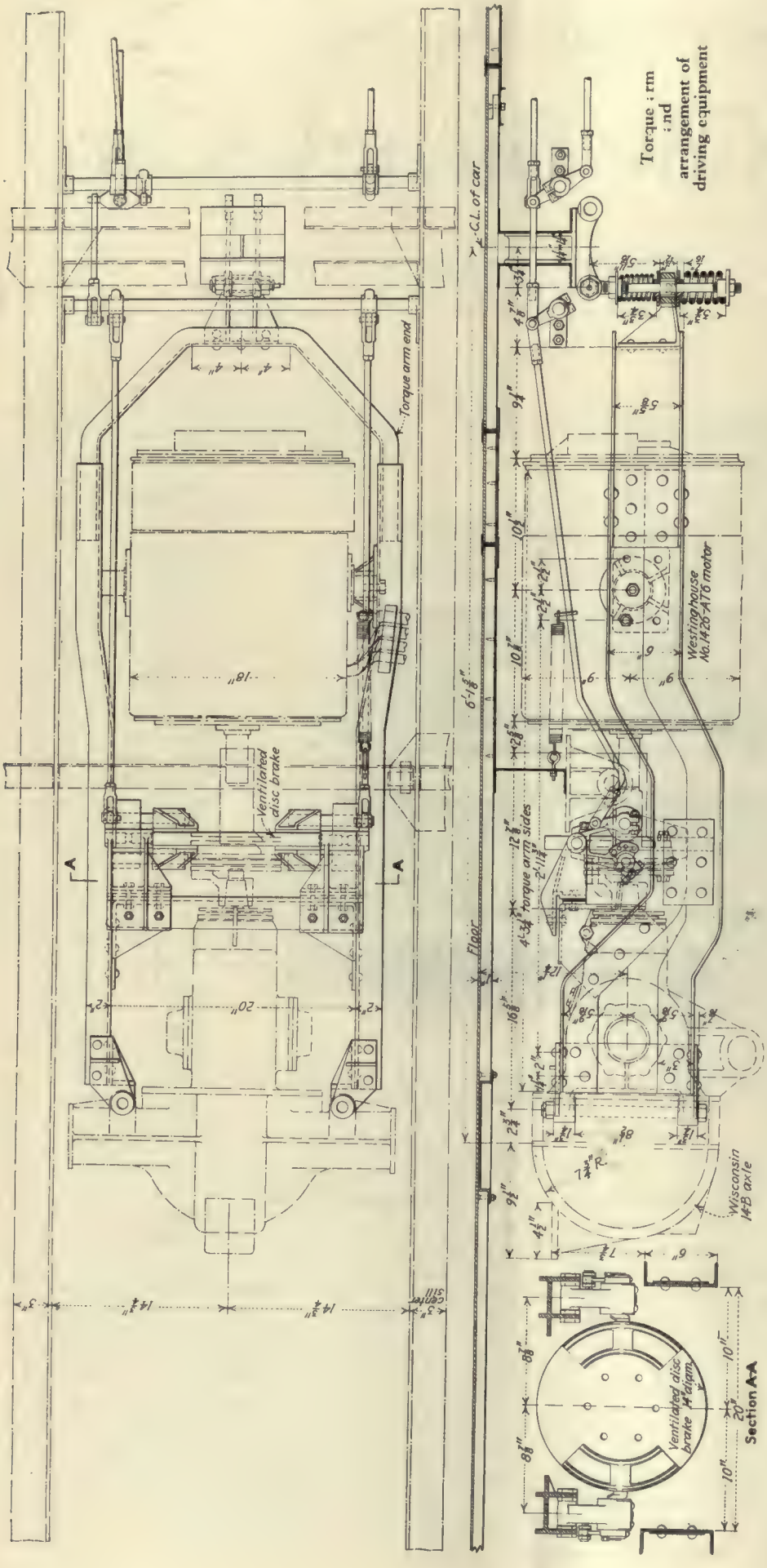
WIDESPREAD interest was aroused throughout the local transportation industry by the new types of four-wheel cars exhibited at the last Cleveland convention. In the cars exhibited automotive running gear ideas were incorporated to give long wheelbase and flexibility for negotiating short radius curves. The general features of these cars were described in the Oct. 20 issue of ELECTRIC RAILWAY JOURNAL. In this article, which is based upon an address delivered by the author before the New England Street Railway Club, Mr. Birney supplies for the first time the full design details of this unusual progeny of the original Birney car. Designed to meet the most advanced ideas of what the modern electric car should possess, the new Birney has a maximum of power so that it can lead traffic and get away from a stop in front of other vehicles. Light in weight, it is economical for operation by one man. The horsepower of the motor equipments was detertmined by the requirement that they be large enough to spin the wheels with maximum load. The maximum acceleration is thus limited only by the adhesion of the wheels to the rails, and tests indicate that the quick getaway provided will permit this type of car to beat automobiles across street intersections and prevent cutting in and blocking of car movement.



With automotive type bumpers, floodlighted front and round corner glass the front end of the New Birney presents an unusual appearance

The car body is 31 ft. 10¾ in. long. This length was determined by the extreme overhang possible where two axles are used and spaced so as to permit operation around a 35-ft. radius curve without danger of splitting switches and without liability of shimmying or galloping. A minimum wheelbase for the truck centers was decided on as 147 in., and the spring base of the car fixed at 207 in. The car body is 7 ft. 10 in. wide, and measures 6 ft. 7 in. from floor to ceiling. Light weight consistent with rugged construction has been obtained by careful selection of materials. The main underframe members are of chrome-nickel steel, heat treated to have an elastic limit of from 90,000 to 100,000 lb. The cross sills are drawn steel shapes and the deep sides are of Plymetl. This was chosen because of its light weight, high resistance to shock, and heat and sound insulating qualities. The roof is plywood and was selected to provide stiffness and light weight. To reduce the blind space on the sides of the car to a minimum, 1¼x1¼-in. tees were used for the side posts. Both the ceiling and floor are of plywood, the latter being made in four sections joined with shiplap and steel plates. In the size and operation of the doors, particular attention was given to reducing the time necessary for boarding and alighting of passengers. The doors are equipped with National Pneumatic Company's devices under the direct control of the operator. The rear door is fitted with treadle control. All equipment is inclosed in cabinets. The controller is on the left side of the car, with lighting and compressor switches in a cabinet at the window sill height under the window at the left of the operator. The brake valve is in front of the operator while the hand brake handle is at his right. Other equipment selected includes the Oskelite signal system, bus-type ventilators, bowl-type lighting fixtures, aluminum grab rails, brass sash that lift 21 in. in the clear, back-up brake valve and control switch, window wiper, window guards, heavy type automobile bumpers, sun visor, dash floodlighting, drawbar and life guard.

Clear vision ahead for both operator and passengers has been obtained by keeping the equipment below the window sill line. A well is provided for the operator's

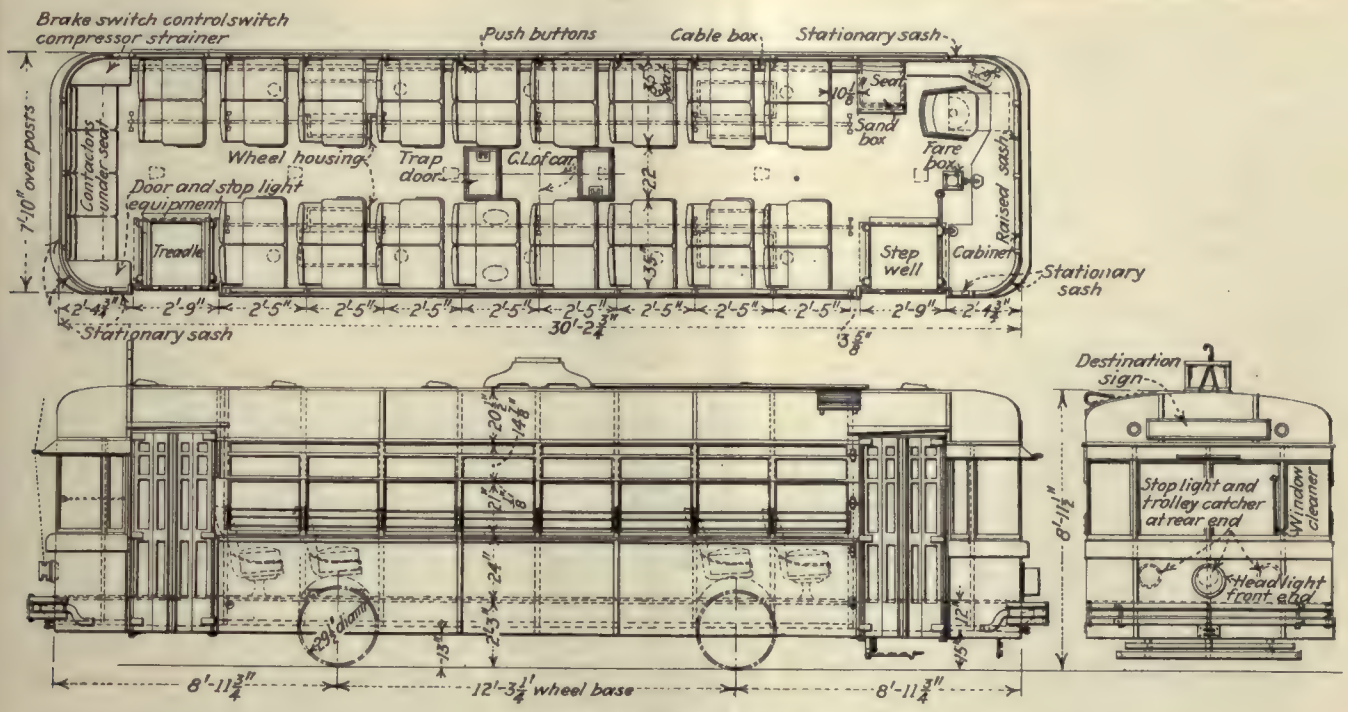


feet, and in this is all the foot-operated equipment of the car. Air connections are made with copper tubing and long compression fittings with standard S.A.E. and Briggs threads. Destination and route signs are special, being made by the Electric Service Supplies Company. The lights used for illuminating the signs and bull's-eye markers are also used for car lighting.

For the protection of the operator against reflections at night a double roller curtain is hung from a swiveling housing attached to the frieze above the window at his left. When the curtain is not in use the housing swings back against the frieze. It is enameled to match the inside finish of the car, so that while it is available instantly when needed it is inconspicuous. The curtain is made in two parts. One may be drawn down directly behind the operator, while the other, toward the fare box, is placed at an angle. A movable arm at the outer end of the curtain housing fits into a small socket on the ceiling, making the housing rigid. A pneumatically-operated Johnson fare box at the right of the operator, is lighted by a lamp set in a special fixture.

Two-Wheel Trucks of Unique Design

The truck frame consists of two steel castings and a forged channel section, to which the castings are riveted. This framework carries a bracket at one end for attachment to the car body through a swivel bolt and two springs. This type of construction permits longitudinal motion of the body and the car springs. The latter are adjusted so as to take the torque of the axle and act as a support at the same time. This arrangement irons out shocks due to starting or stopping. The end of the frame opposite the torque bracket is attached to the axle housing by two through bolts. The truck is attached to the body through the semi-elliptic springs. Chrome nickel steel U-bolts with S.A.E. threads and extra long nuts are used to attach the springs to the axle. At these points the axle is machined round, and cast-steel spring seat pads are machined to a smooth



Plan and elevation of the car

turning fit. These are provided with Alemite fittings for lubrication.

At their trailing ends, the springs are attached rigidly to the body sills. The leading ends are attached through shackles which permit elongation under load. By placing the shackles on the leading end of the spring the car is pulled. This type of construction corresponds with the latest developments in heavy-duty auto trucks, and tends to avoid shimmying. The method of attachment is also intended to hold the axles parallel with each other, while the truck frame relieves the springs of all starting and stopping strains without interfering with the free motion of the springs and axles.

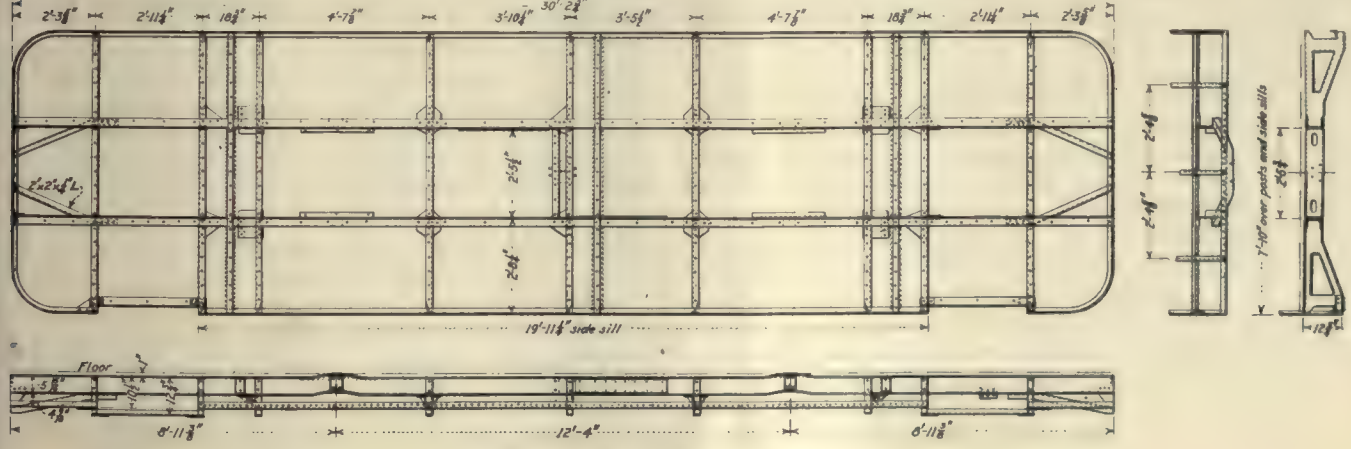
Hand Brake Construction

Stabilizing springs are used to keep the wheels in alignment. In addition to supporting the motor the truck frame supports an independent hand brake. This is a double-shoe, double-disk type made by the American Cable Company. It is attached to the coupling on the pinion and armature shaft, and owing to the 8.64 to 1 gear ratio of the axle, and the 5 to 1 ratio of the hand brake lever, it is possible to slide the wheels with ordinary physical effort. Full braking power can be applied in a single motion and with minimum loss of time.

Special Axle Construction Used

Driving motors are hung on trunnions, which permit free movement. They are connected to the pinion shaft of the axle with flexible joints which avoid the necessity of making and maintaining an exact alignment of the parts. All truck parts are designed with a view to their being maintained by the ordinary car crews, and parts are machined accurately so that they are interchangeable.

The axles of full floating construction are known as a double-reduction, driving-steering type. They have a gear ratio of 8.64 to 1. The primary drive is through a spiral bevel gear to a spur gear, which contains the differential. The bearings are Timken roller and New Departure ball types. All are proportioned for heavy service. Adjustment of bearings is provided for as on automotive trucks. The special feature of the axle is the steering driving knuckle and joint. The steering knuckle is designed as a single piece, with trunnions for



Construction details of underframe

mounting the Timken thrust bearings which take the load due to the swiveling action of the wheels. Seats are turned on the steering knuckle for the heavy-duty Timken bearings that carry the wheel loads. The knuckle is bored to receive the live axle and the "Uniflow" joint. For this type of drive to the wheels, a standard universal joint could not be used on account of the variations in speed at which an ordinary universal joint makes the two half revolutions. For this reason a special "Uniflow" joint is used at this point. With this construction the torque is transmitted to the wheels without distortion, and all danger of a jerky motion being transmitted to the car body is eliminated. The body of the axle is a high-grade annealed steel casting.

Brakes are built into the axle. They are of the double shoe internal expanding type operated by a constant lift cam actuated by Westinghouse air cylinders. These insure a constant braking effort at uniform pressure, and provide a smooth stop which is under the operator's control at all times. Brakeshoes are removed by taking the heads off the axle and replacing the shoes at a bench. Removal of a bolt permits the withdrawal of two brake pins, so that the heads and shoes can then be slipped out.

The wheels consist of four principal parts. These are the steel tire with A.E.R.A. tread and flange, the sound and shock-absorbing tire, the hub, and the driving cap. The steel tire is made of standard rolled steel wheel material, bored to limits that insure interchangeability. It is pressed on the rubber tire with approximately 25-ton pressure. This rubber is a special compound prepared to take the loads that can be expected in electric railway service. It is cured to the inner and outer rims so that all parts of the material are stressed by the load, the lower part being in compression and the upper part in tension.

The hub is machined from a high-grade steel casting. It is bored to take two Timken bearings, both of heavy-duty railway type. It also carries the brake drum, which is attached with dowel pins and cap screws that make renewal an easy matter. The hub is machined for a press fit of 25 tons in the rubber tire, which is pressed home against a shoulder on the hub. Brake drums, Timken bearings, rubber tire and steel tire are all machined and mounted in relation to the wheel gage lines, which make it possible to make replacement that will not vary more than $\frac{1}{32}$ in.

Another steel casting machined to fit the hub and the live axle forms the driving cap. This is attached to the hub by studs, and is driven by the live axle through splines similar to those used in standard automotive practice. An entire wheel weighs approximately 450 lb. The steel tire can be replaced easily when it has reached its limit of safe wear.

Electrical Equipment of Light Weight Type

The car is equipped with two Westinghouse type I-426, 600-volt motors of 50 hp. capacity. They weigh 800 lb. each and are provided with dual ventilation, with one stream of ventilating air passing through the armature core while the other passes over the surface of the armature and around the field coils. Due to the fact that the motor is spring supported it is possible to use a light-weight high-speed type and so obtain economy in weight and space. Each of the motors drives one axle through a differential and the double reduction gears.

The control equipment is of the Westinghouse light-weight type with magnetic control. The main circuit connections are made by remote-controlled magnetic contactors. The direction of the car movement is governed by a hand-operated drum-type reverser. Overload protection is provided by means of a clapper-type overload trip. The plunger of this assembly carries insulated contact disks, and when an overload occurs the circuit to two of the contactor operating coils is broken, thus allowing two switches to open and interrupt power to the propulsion motors. The overload trip includes a pneumatic plunger assembly, called the knockout cylinder. The functioning of this is correlated with that of the safety devices handle assembled with the master controller, so that when the handle is released in an operating position air is admitted to the plunger and the overload trip is knocked out, thus disconnecting power from the motors in the same manner as when an overload occurs.

Reduced Voltage for Control Circuits Obtained Through Resistance

Energy for operation of the magnetic contactors is taken from shunt taps on a high resistance connection between the trolley and ground. In this manner higher voltages are kept from the control circuits. The control energy for the contactors is taken from the shunt taps through several of the operating coils to the master controller, and from the master controller through the remaining coils to ground. The potential of the master controller and the grouping of the coils between the shunt taps is such as to balance voltage on all circuits and at the same time maintain low voltage throughout.

The action of the hand operated reverser is not interlocked with that of the master controller. However, the reverser includes an electric interlock which drops out the line switch before the main circuit is broken on the reverse fingers. This eliminates burning of the reverser fingers and contacts. The control circuits are arranged so that it is necessary to close the line switch on the first position of the master controller and hold it closed by its own "In" interlock on all other positions. This insures that power cannot be applied to the motors in case the reverser is thrown with the master controller on any operating position. The possibility of jerks from this source is eliminated and the resistance will again be inserted in circuit with the propulsion motors when the power circuit is again re-established.

Most of the operating devices are located in a neat cabinet at the front of the car, and the switches are under the rear seat in an inclosed structure. The only device under the car is the main motor resistor. This is the Westinghouse type M, which offers the advantages of lightness, weighing only about a third as much as do the grid types.

The electropneumatic safety car devices included were developed to perform all the functions of the ordinary safety car equipment. They give quick application and release of the brakes. The control may be in the controller handle or in the brake valve handle. The cab appearance is improved by the reduction of pipes, and the duty on the compressor is reduced on account of lessened pipe leakage. Door operation is improved by the elimination of any lag in bringing about the opening or closing movement.

A variable load braking device is provided to give uniform braking regardless of load. This has the usual air compressor, reservoirs, two governors, four air-brake cylinders, (one per wheel), air-operated sanders, and National Pneumatic Company's electro-pneumatic equipment for operating doors and treadle.

I.R.C. Builds One-Man Sand Drier

Plant of 10,000 tons per year capacity built for $17,000 is operated by a single man. The cost of receiving and drying sand is 89 cents per ton



At this one-man sand drying plant a crane unloads sand from canal barges, railway flat cars and motor trucks. The sand car is loaded by gravity underneath the dry sand storage tank which has itself received the sand under air pressure from the drying plant

NOT content with one-man operation of all local cars in the three cities of Buffalo, Niagara Falls and Lockport, the International Railway has sought further economies through application of the one-man principle to other phases of its business. A sand-drying plant of 10,000 tons per year capacity has been designed and is now in daily service, operated by one man. The operator unloads the sand from the barges in which it is delivered, runs the plant, maintains a reserve supply of sand, assists in loading a pneumatic sand car specially designed by the company, loads all sand and gravel required for construction work, and bags the sand for delivery by flat car. During October and November he received and stored a reserve supply of 4,500 tons of wet sand. Although the present annual consumption of sand on the system is about 6,000 tons, so that 180 days of operation will meet all requirements, in designing the new plant provision was made for possible future expansion. The economies under present normal consumption, it is estimated, will pay the entire cost of the plant, $17,000, within 2½ years.

All sand used on the transit lines, as well as all sand required by the company for construction purposes, is supplied by this one-man plant. Although there are few grades in the 415 single-track miles of the International Railway, the sand consumption is relatively high, particularly during the winter months, because of snow and ice conditions. Furthermore, the trainmen have been encouraged to make a liberal use of sand for the sake of safety.

The one-man sand-drying plant has an actual daily capacity of 28 to 38 tons of sand. The variation is due to difference in moisture content. Daily cost of operation is $15.27, and the average operating cost per ton, including unloading from barges, is 46 cents.

Gas is used for fuel in the drying plant. Although somewhat higher in cost than coal or other fuels, it requires no attention, eliminates necessity for handling the fuel and the ashes, and saves the cost of fire box repairs and renewals. The usual high costs of maintaining conveying equipment have been reduced to a minimum, since the plant has only one seven-foot pan conveyor. These are the principal factors reducing labor and making possible one-man operation.

The plant was developed as the result of a thorough study by company engineers of the problem of obtaining a sufficient quantity of dry sand delivered at the lowest cost. Originally each carhouse maintained its own sand-drying equipment, consisting essentially of a series of steam coils supplied by the heating boiler of the carhouse and placed inside a sheet-iron hopper. Wet sand was distributed to the carhouses from storage by flat car and fed into the hoppers by hand. After being dried it was screened into storage piles by hand.

New Plant In Service Several Months

The new plant, which replaces all other sand-drying equipment, has been in daily service for several months. Its location on Scajaquada Creek, in the city of Buffalo, was chosen in order to facilitate delivery of wet sand to the plant and of dry sand to carhouses, street boxes and other points of use. This location permits direct unloading from sand barges into the plant's wet sand storage bin, with deliveries of wet sand by flat car or by motor truck also if possible.



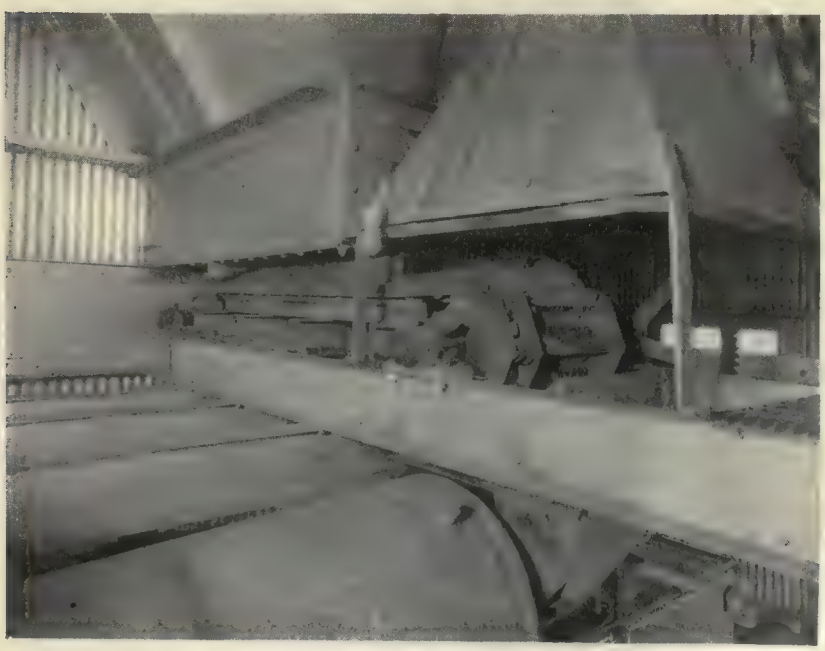
Discharge end of one-man sand drying plant. Sand passes through screen in drier shell to accumulator bin or to dry sand elevating tank at pit bottom. Compressed air hoists sand from elevator tank to outside dry sand storage bin through 3-in. pipe

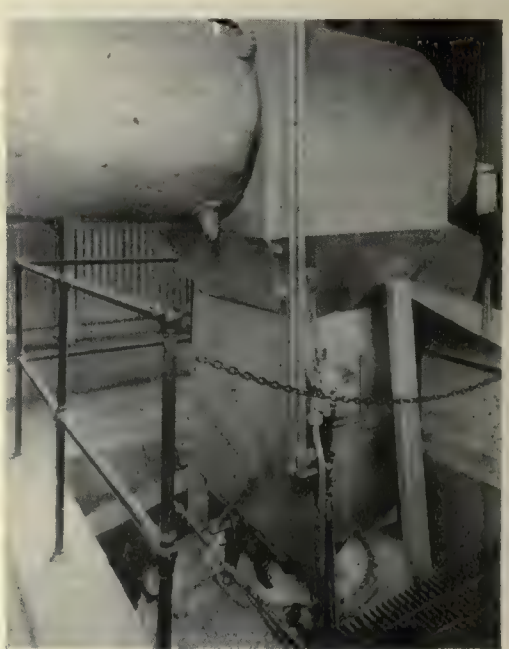
The structure is entirely fireproof and consists of a wet-sand storage bin, from which the sand is fed by gravity into a wet-sand pan conveyor, a gas-heated rotary Harmor drier, a pneumatic dry-sand elevating tank and accumulation bin, and a dry-sand storage tank from which the sand is delivered by gravity to a pneumatic sand car or to flat cars for bag loading.

Sand sucked from Lake Erie or from the Niagara River is purchased on contract and is delivered directly to the plant by barge, being unloaded by means of a crane and clam-shell bucket directly into the wet-sand storage bin or into storage heaps as desired. The storage bin, which has a capacity of about 45 tons, is so built that three of its four sides are steeper than the angle of repose, thereby preventing arching of the wet sand, a source of frequent difficulty in many plants. The sand is carried from the bottom of this storage bin by means of a seven-foot pan conveyor, which delivers the sand directly into the burner end of the gas-fired rotary drier. The speed with which the sand is fed into the drier can be varied by a gate controlling the height of the sand delivered to the conveyor, or by means of a Reeves variable-speed transmission controlling the speed of the conveyor.

The drier drum is 30 in. in diameter and is inclined 18 in. in its 30-ft. length. It is rotated at a speed such that the passage of sand through the drier consumes about ten to twelve minutes. Flights are attached to the outside of a central mandrel 10 in. in diameter and to the inside of the outer drier shell in such a way that, as the sand passes through the rotating drier, it is continually cascaded from one set of flights to the other and thereby is uninterruptedly exposed to the drying effect of the hot gases passing through the drum. A high-pressure gas burner fires the drier, the flame passing through the central mandrel to the discharge end of the drier where the hot products of combustion are reflected through the outer drum and outside the mandrel, discharging into the atmosphere at the wet-sand end of the drum through a hood and stack. A cylindrical screen built into the discharge end of the drum automatically screens the sand as the drier rotates. The dry, screened sand then falls through an accumulator bin directly into a pneumatic sand elevating tank of five tons capacity, while the screenings are delivered by a short chute to a wheelbarrow, which is adequate to provide for one day's screenings.

When the dry-sand elevating tank has been filled, a foot valve is closed, shutting off this tank from the rest of the system and permitting the plant to continue operation by delivering the dry sand to the accumulator





Interior Appearance of Sand-Drying Plant

A 7-ft. pan conveyor transports wet sand from receiving hopper to burner end of dryer. The hood to the right carries off the products of combustion after they have passed through the mandrel and returned between it and the outer dryer shell.

Closeup of discharge end of drying plant. When elevating tank at pit bottom is to be emptied, a foot valve shuts off the tank from the rest of the system and sand coming from the dryer is received in an accumulator bin above.

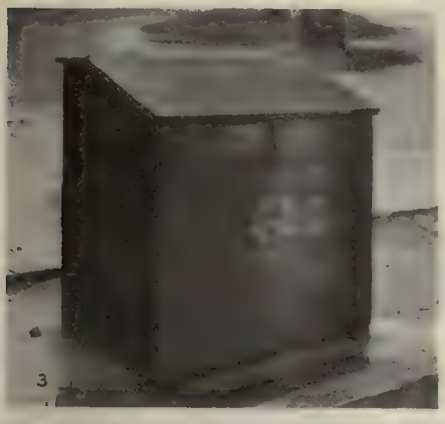
Equipment Used by International Railway in Delivering Sand



1



2



3



4

No. 1—This pneumatic sand car has a capacity of 22 tons and delivers about three quarters of the dry sand used by the I.R.C.

No. 2—Vestibule of sand house; gravity feeds sand to pails used in replenishing car supplies.

No. 3—Type of street sand box that is used by the International Railway.

No. 4—The pneumatic sand car is used to fill carhouse and street sand boxes.

bin above the pneumatic elevating tank. Compressed air from a compressor having a capacity of 120 cu.ft. per minute is then admitted to the pneumatic sand elevating tank, and lifts the sand through a three-inch pipe to the top of the dry-sand storage tank of 225 tons capacity, outside the building—a distance of approximately 30 feet. A pressure of 50 lb. will empty the dry-sand elevating tank in about seven minutes. This compressed air system replaces all mechanical dry-sand conveying apparatus, with its operating difficulties, delays, loss of time, and higher maintenance costs.

Sand Delivery Next Studied

Not content with the development of a highly efficient and economical drying plant, the methods of delivery and storage of sand throughout the system were next studied by the company's engineers. The purpose of the study was not only to secure the most economical delivery of sand to the point of use, but also to safeguard its quality. A pneumatic sand car was especially designed and built which could be moved directly under the dry-sand storage tank at the central drying plant, and loaded by gravity. Delivery of sand from the car to the car-house bins and to sand houses located at the ends of the street car lines is made by compressed air through a 4-in. pipe. The sand car, which has a capacity of about 22 tons, delivers about three-quarters of the dry sand used on the system, the remaining one-fourth for convenience being delivered in bags by flat car to the small street boxes.

The pneumatic sand car is used not only in the city of Buffalo, but throughout the International Railway system, thus almost entirely eliminating hand labor in the delivery of sand to the sand houses, each of which holds about 25 tons. Two-thirds of the capacity is live storage from which the sand falls through a chute into a vestibule, where are kept pails for expediting the delivery to the street cars.

Although the sand houses in some cases hold a supply sufficient for one month's service, there are many places where houses of such capacity cannot be built, but where it is necessary for trainmen to replenish the sand supply on their cars quite frequently. At these points, small,

neatly painted, but unlettered boxes having a capacity of one to three tons are placed—usually set between the curb and the sidewalk. It has not been found practicable to fill these sand boxes from the pneumatic sand car because of the frequent trips necessary and because the unloading of sand via the discharge pipe would cause some delay to traffic. These boxes, therefore, are replenished from flat cars or motor trucks carrying sand in bags filled at the central plant by means of a special arrangement of discharge pipe and valve designed for this purpose.

Accomplishments Summarized

A summary of the accomplishments resulting from the I.R.C. one-man sand-drying plant, the pneumatic sand car and the company's method of distribution and storage of dry sand follows:

The daily operating cost of the plant is $15.27—made up of ten hours labor at 65 cents; 9,650 cu.ft. of natural gas at 65 cents per 1,000 cu. ft.; electricity $1.50; and lubrication, inspection and repairs $1. These figures (on the basis of 180 days of operation—sufficient to meet present demands), give a weighted cost of 46 cents per ton for receiving and drying the sand. The cost of the drying plant was $17,000. A charge of 15 per cent for interest, depreciation and taxes, amounting to $2,550,00 (43 cents per ton on the basis of an annual 6,000 tons of sand handled), added to the operating cost per ton of sand of 46 cents brings the cost of receiving and drying sand to 89 cents per ton.

The pneumatic sand car can be loaded, run to a carhouse 11 miles away and unloaded inside of three hours at a labor cost for two men of $3.75, or delivery cost per ton of 17 cents, which added to the 89 cents cost of sand at the plant bring the total cost of receiving, drying and delivering sand to the car-houses to $1.06 per ton. It is difficult to arrive at a cost comparable to that on any other system because of the variations in the method of delivery and of the quantity of sand used at various locations. However, the figure of $1.06 is a fair approximation for the carhouses located within the city of Buffalo.

The cost of the sand car was $8,153, and the annual economy resulting from its use is computed at $3,667. The cost of 20 sand houses was $6,000, and this investment produces an annual economy of approximately $1,866 by decreasing the number of delivery trips and the labor item. The anual operating economy through the use of the $17,000 sand-drying plant is an estimated $7,000, so that the total economy resulting from the new system of drying and distributing sand amounts to $12,500. In addition the company now has the assurance of thoroughly dependable deliveries of a uniformly high quality of dry sand—the cheapest and most effective of all safety materials.

Uniform Traffic Code Prepared for Wisconsin

RECOMMENDATIONS for a uniform state traffic code have been made by the Wisconsin Highway Commission. The proposed code imposes a speed limit of 45 m.p.h. C. N. Maurer, traffic engineer of the commission, said that if county traffic officers were responsible to a central department instead of to county officials the recommendation would be to "set no speed limit whatever because under certain conditions one can drive more recklessly at 25 m.p.h. than at 45."

Louisville Grade Crossings Eliminated

ELIMINATION of the grade crossings at Fourth and G Streets in Louisville not only has removed a great accident hazard but also has speeded up street railway service materially. Both the Louisville & Nashville and the Southern Railroad cross the streets at this point, and a viaduct was constructed to carry their several tracks. Under the terms agreed upon by the three interested parties, the city paid 14 per cent of the total cost of $320,318, the Louisville Railway paid 21 per cent and the steam railroads 65 per cent.

New Buses Exhibited at the Berlin Automobile Show

SEVERAL new types of buses were on exhibition at the International Automobile Exposition at Berlin held last November. Two exhibited by the Büssing Automobile Works are typical of the output of the German manufacturers and are illustrated herewith. The upper view is of a six-wheel single-deck bus built for the Strassen-Omnibus Gesellschaft of Cologne. It is designed to seat 29 passengers and has standing room for



Types of buses shown at the Berlin International Exposition of 1928

an additional 21 passengers. There are both front and rear doors, and the wheel base is shortened by setting in the front wheels. Features claimed for these buses are their low weight, because of the use of light metals in their construction, reduction of noise in operation, low floor combined with ample clearance under the bus, a six-wheel air brake with two mechanical auxiliary brakes and a six-cylinder motor.

The lower view is a "one-and-a-half-deck" touring bus, with baggage compartment below the rear upper deck. This bus has room for 21 seated passengers, and the general principles of construction follow those mentioned in connection with the Cologne bus. A considerable percentage of this company's bus output is now six-wheel buses, of which it has built some 1,200.

Helpful Suggestions *for the* Electrical Repair Department

Removing Armature Wire Bands

WHEN removing wire bands in preparing an armature for stripping, it is quite easy to injure the underlying core, insulation or leads. Bands often have to be removed from armatures that are not to be stripped, so it is quite necessary that they be removed properly.

A center-cutting cold chisel of the form illustrated, is the best tool to use in cutting the bands. The chisel should be placed across the band and just over the edge of a core tooth, as shown in another illustration. It is best to cut the wires one or two at a time. When severing the last turn of

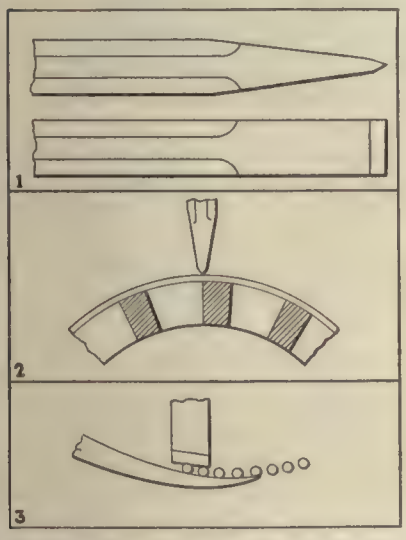


Fig. 1—Chisel for cutting wire bands
Fig. 2—Method of cutting center bands
Fig. 3—Using a curved drift to support end bands while cutting

a band the repairman should stand at one side to avoid being struck by the recoiling end.

When cutting the end bands the procedure must be modified because the foundation under these bands is more yielding. A curved chisel or drift, as shown in Fig. 3, is helpful in this work. Since the drift is used for driving under the bands and not for cutting, it can be drawn to a taper ending in a sharp edge, making it easier to drive under the bands. The edge of the cutting chisel is held parallel to and just over the side of the curved drift, so that in the cutting, its edge is sheared along the side of the drift into a clearance. This clearance is caused by some of the band wires being lifted from the bedding.

With the drift forced a short distance under the wires a few wires are cut. The drift is then driven further and a few more wires cut. When cutting the last wire, the operator should stand aside as advised when cutting core bands.

It is not customary to use a chisel in cutting wire bands that are run onto the leads behind the commutator. Instead, the flaps of all clips are cut off, one end of the band released and the band removed by pulling it off turn by turn while the armature is rotated by hand.

Checking for Armature Defects

WHEN the armature of a railway motor is received in the shop for repairing, it generally bears a tag that indicates the nature of the trouble for which it was sent in, as far as the maintainer was able to diagnose it. When armatures are received in numbers, some of the tags may be missing, some may have become interchanged and others may be marked with the effect rather than with the cause of the trouble. It is customary, therefore, to go over the armatures carefully and check them. To assist the man who does the checking, a list similar to the one following will be found valuable in making certain that no possible defects are overlooked.

1. Grounded front mica V-ring.
2. Rough commutator.
3. Loose commutator bars, detected by tapping all the bars with a small hammer.
4. Commutator struck or rubbed by a brush-holder or foreign object.
5. Broken tangs.
6. Open-circuit, indicated by diametrically opposite pairs of commutator bars being burned.
7. Core rubbing pole-pieces, indicated by areas rubbed smooth on core or on banding clips.
8. Armature coil grounded to core or to a band wire on the surface where it can be seen.
9. Roasted armature coils, caused by a short in the commutator and evidenced by discoloration of two top coil legs diametrically opposite each other.
10. Armature winding rubbed on rear end, due to excessive end play in bearings.
11. Missing band wires.
12. Loose band wires, determined by trying to displace them laterally with a hammer and drift and noting the resistance offered to displacement.
13. Hot bearings.
14. Tapered bearings.
15. Bearings under the standard size.
16. Condition of keyway.
17. Condition of pinion fit.
18. Condition of pinion nut thread.
19. Condition of shaft centers, as to depth and trueness.
20. Armature shaft bent, core wobbly or core sleeve loose, detected by swinging in lathe. Armatures whose shafts can not be replaced without removing the winding, should be detected at an early stage of inspection.
21. Armature should be tested for grounds at high voltage.
22. Commutator should be cleaned, the slots raked and the armature tested for short-circuits and poor connections.
23. Depth of slotting to be gaged.

Removing Commutator Leads of Strap Wound Armatures

IN STRAP wound armatures, great care should be taken in removing the leads from the commutator. The leads extend to a considerable depth and the tang walls at the bottom of the slots are often very thin, even when the milling is truly radial. When the slot is not milled truly radial, the walls offer a more serious problem. It is necessary, therefore, in stripping an armature whose tang walls are thin to use an air-gas torch for loosening the leads before attempting to lift them. The leads cannot be driven out safely with a drift because of the almost certain danger of breaking a tang wall.

The air-gas torch should be mounted permanently on an adjustable stand, so the flame can be directed and its hottest point focused at will. The hottest part of the flame should not be focused exactly on the bars, but on a point beyond them and

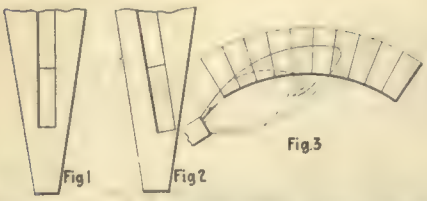


Fig. 1—An armature slot milled truly radial

Fig. 2—Thin spot caused by milling the slot at an angle

Fig. 3—Method of directing the torch flame to heat the tangs properly

at an angle permitting the flame to heat the entire side of a tang. The method of directing the flame on the commutator bar is illustrated in Fig. 3. When the solder begins to melt, a mild lifting effort should be exerted to see that all the leads of that particular coil are thoroughly loosened from the tangs before attempting to lift any lead with force. When all the leads of any particular coil are thoroughly loosened, the whole set of leads can be lifted bodily.

While the flame is being directed to any particular bar, and is heating it to the sweating point, it heats the bar next to it appreciably, so that after the first bar has been heated, less time is required to heat the succeeding bars to the required temperature. The procedure, therefore, consists in turning the armature sufficiently after a coil has been lifted to permit the hottest part of the flame to be directed on the next bar.

As each set of leads is lifted from the commutator, it is advisable to clean the vacant slot with a piece of heavy, dampened cotton tape. This cleaning can be conducted while the next bar is being heated to the proper temperature.

Aligning Distorted Banding Grooves

IN ASSEMBLING new armature cores, the banding grooves are not likely to need attention further than straightening their sides. When a core has been down on the pole pieces, however, and it has been necessary to reduce the length of the expanded teeth by laying back the tooth part of the laminations and driving them back into place, the alignment of the banding grooves may become distorted. If this occurs, the widest band that can be used will be considerably narrower than any individual banding groove would accommodate.

When the grooves are only slightly out of line, the sides of the grooves can be driven back into place with a hammer and a drift of the shape shown in Fig. 1. If the displacement is too great to be overcome by this method a safety file can be used for aligning the sides of the distorted grooves. For very badly distorted grooves, it is customary to drive hard wood sticks the full length of all the slots to support the teeth against the pressure of the cutting tool, and then to true the banding grooves in a lathe.

It is quite essential, in any event, to check the alignment before proceeding further. An effective way of doing this is as follows:

Cut a piece of tin, measuring one-fourth of the armature circumference in length and a little narrower than the width of the standard banding groove. Ignore the grooves that are displaced to a considerable extent in either direction and select several grooves that are of average displacement and which are equally spaced around the core. Align them with the file or drift until the test piece, when laid on the core as indicated in Fig. 2 and moved around by hand, will check the several equally-spaced grooves that have been trued. One side of the extremely displaced banding grooves can then be straightened up or filed back until the grooves come within the limit allowed by the side of the test piece. A band of maximum width can then be applied.

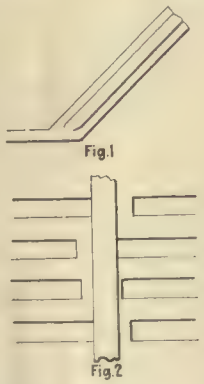


Fig. 1—Drift for straightening sides of banding grooves

Fig. 2—Distorted grooves prevent the use of full width bands

Straightening Core Tooth Laminations

WHEN an armature is new, the ends of the core teeth are perpendicular to the center line of the shaft. Frequently, however, an armature is rubbed by the pole pieces and the laminations are fanned out, especially on the pinion end. When the laminations are rubbed hard a fin is formed at the top, as shown at *b* in Fig. 3. As a result the armature coils cannot be installed safely, and so it becomes necessary to straighten up the core.

The first step in the straightening process is to lay back the laminations, several at a time, as far into the tooth as the deflection extends. A long wedge or drift is the proper tool to use for this work. The type of drift to use and the method of using it in laying back the laminations are illustrated in Fig. 1.

When all of the affected laminations have been laid down they are driven back into their normal position, one at a time, as indicated in Fig. 2. The side of the drift is struck as close to the core as possible in this step. When all laminations have been driven back into position the tops of all teeth will be of their original length.

Spreading the laminations and driving them back into position one at a time, as described, serves to straighten out the fins which form at the top of each lamination when the surface of the core lamination is rubbed on the pole pieces. These fins hold the laminations apart and cause the core teeth to assume a fan shape. The straightening procedure also flattens any curved laminations, as shown at *A* in Fig. 2.

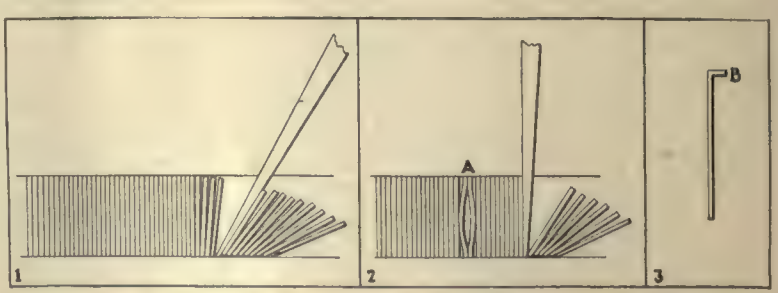


Fig. 1—Type of drift to lay back the laminations, and how it is used

Fig. 2—Driving the laminations back to their original position, one at a time

Fig. 3—A fin on one of the laminations, caused by the pole pieces rubbing

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—41

Special Frame Takes Strain in Track Removal*

By T. H. David
Chief Engineer Indianapolis Street Railway, Indianapolis, Ind.

FOR several years old track on lines of the Indianapolis Street Railway was removed from the street by a direct pull of the boom of a derrick car. This car is equipped with a double drum hoist operated electrically. The direct pull was injurious to the car boom and body and produced a severe strain on the king pin of the body. Several years ago an A frame was designed to relieve this condition. As the pull





Frame in position for pulling rails

*Submitted in Electric Railway Journal Prize Contest.

(OVER)

Electric Railway Journal Maintenance Data Sheet

LINE DEPARTMENT—10

Straight Trolley Wire for Through Cars Prevents Dewirements*

By John L. Spencer
Foreman Duluth Station
Twin City Lines, St. Paul, Minn.

DAMAGED overhead with wire often torn down resulted from frequent dewirements at the car yards of the Duluth Avenue station, Twin City Lines, St. Paul, Minn., until a second straight wire was installed. Now main-line suburban and local cars use the straight wire without frogs, and cars entering or leaving the yards use the other one. There are 32 tracks and fourteen overhead frogs at this point. Trolley wheels of cars pulling out of the yard and carhouse do not touch the main-line wire until they leave the last track at the end of the yard. At that point a going out switch is installed for satisfactory operation.

The additional straight trolley wire is supported to the wire with the frogs at each frog by an 8-in. insulated gooseneck. This holds the two wires 8 in. apart all along the distance of 400 ft. The main-line straight wire is also supported by span wires which lead to iron side poles on the street. The wire with the frogs is supported by span wires leading to the iron poles in the yard.

Regular wooden hangers are used on both wires. These are the same as are used on all lines of the company. This type of construction has now been in use for over a year, and trouble from dewirements has been entirely overcome.



The main-line straight wire is supported at each frog of the second wire by an 8-in. insulated gooseneck



Standard wooden hangers supported from span wires are used on both wires

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—41

Special Frame Takes Strain in Track Removal—Continued*

necessary to remove old track was indeterminable, the members of the frame work were designed to withstand strain equal to the tensile strength of a $\frac{5}{8}$-in. cable. The two posts of the A-frame are made of 7x9-in. white oak ties with a band of iron around the base of each to retard brooming. These posts are capped with $\frac{1}{2}$x6-in. iron plates to which a single hoist line is attached for raising and lowering the frame. Two 6x6-in. yellow pine struts are secured to the $1\frac{1}{4}$-in. boom pin with a clevice and cotter pin to resist the load. A heavy-duty sheave with extra strong load hooks and rail tongs completes the unit.

The A-frame is hauled to the job on a small flat car by the derrick, which is self-operating. The equipment can be set up in 30 minutes. Holes are dug on each rail to attach hooks and the pulling is done alternately on the two rails. Usually the rail leaves the ties, but where the spikes hold it lifts the ties and paving. In the job illustrated, very few spikes held, but the pavement broke up readily so that it was removed easily. After removal, the rails are cut up by a torch. The A-frame is removed and the derrick is used for loading the scrap. The effective lift in pulling the rail is about 2 ft., it being limited by trolley clearances. The machine operates after midnight when the tracks are not used for service. One thousand feet of track can be pulled in a night so that a shovel can start excavating the next morning. This method usually destroys the rail except for scrap purposes, but by careful pulling the rail can be saved, if desired, for further use.

**Submitted in* ELECTRIC RAILWAY JOURNAL *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

LINE DEPARTMENT—11

Trolley Pan on Drawbridge Prevents Delays*

By C. B. HALL
Chief Clerk Mechanical Department
Virginia Electric & Power Company, Norfolk, Va.

DURING the construction period of a drawbridge over which one of the suburban lines of the Virginia Electric & Power Company operates in Norfolk, boats with high masts were not permitted to pass through the draw. With a considerable increase in boat traffic, however, it became necessary to permit the passage of such boats, and on these occasions it was necessary for linemen to cut and repair the trolley wire. As this caused considerable delay to service as well as increased maintenance cost, J. C. Newman, engineer maintenance of way, arranged a device using a trolley trough. The pan is made of $\frac{1}{4}$-in. sheet copper about 6 in. wide in two pieces, each 1 ft. long. It is suspended from the steel trestle work attached to the draw and which runs upwards from the floor. The trestle work is held in position by wooden stringers, each 7x14 in., which are placed beneath the floor of the bridge. The pan is constructed so that it opens with the draw, and when it closes the pan parts are brought together so as to form full contact. The cost of the installation was approximately $450 but more than this amount has been saved, as previous to its installation each cutting of the trolley wire involved a cost of $25. A five-minute schedule is now maintained across the bridge without serious interruptions.



Trolley pan and suspension as used by the Virginia Electric & Power Company

**Submitted in* ELECTRIC RAILWAY JOURNAL *Prize Contest.*

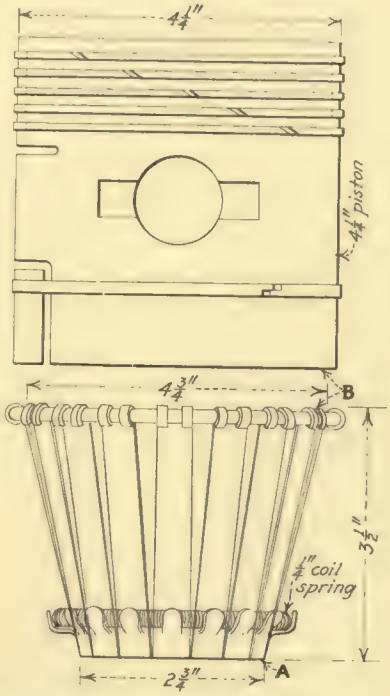
Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—20

Piston Ring Compressor a Handy Tool*

By Charles Herms
General Foreman San Diego Electric Railway
San Diego, Cal.

INSTALLING piston rings in the cylinders of bus engines is always a tedious job, and unless proper tools are used with care breakage of rings is quite common. A variety of piston ring compressors have been tried in the garage of the San Diego Electric Railway, but the one which has proved most satisfactory and is now used is called the "Stevens Piston Ring Compressor." With this tool all sizes of bus engine pistons can have the rings applied. In operation the bottom of the piston, *B* in the sketch, is slipped into the large end of the ring compressor and is pushed down until the bottom end of the piston is flush with *A*. In this position, the ring compressor at *A* is larger in diameter than the cylinder bore, and consequently will set on top of the cylinder bore. The piston is then ready to be pushed into the cylinder. The ¼-in. coil spring around the arms of the compressor is strong enough to compress the rings as the piston is forced through, and there is no loss of time as the piston can be pushed into the cylinder in a few seconds.



Piston ring compressor used in the shops of the San Diego Electric Railway

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—MISCELLANEOUS—53

Adjustable Broach for Slide Valve Seats*

By R. H. Hensler
Foreman Air Brake Department,
Brooklyn City Railroad, Brooklyn, N. Y.

COMMON practice when overhauling emergency and relay valves is to file the slide valve seats in the brass bushings before spotting and grinding in the valves. The job is a tedious and difficult one and takes from 15 to 25 minutes. This practice has been discontinued in the shops of the Brooklyn City Railroad and an adjustable broach, developed in the shops, has been substituted. As a result the time now taken for the work is from two to five minutes and the accuracy of the work has been increased considerably.

The tool used consists of an adjustable broach which has four parts. These are (1) the broach body having the cutting teeth; (2) the guiding sleeve turned on the outside to fit the bore of the bushing to be broached and machined on the underside to fit the broach body and the tapered key; (3) the threaded nut, and (4) the tapered key. By screwing on the threaded nut the tapered key is forced in, thus raising the cutting teeth. The depth of the cut is governed by the position of the tapered key as controlled by the nut.



Adjustable broach for slide valve seats as used in the shops of the Brooklyn City Railroad

**Submitted in* Electric Railway Journal *Prize Contest.*

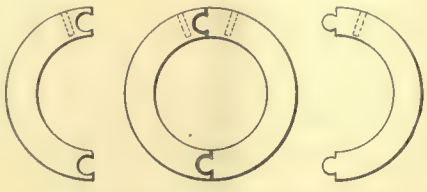
Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—21

Clutch Brake Disk for Buses*

By John McKenzie
Garage Foreman Boston Elevated Railway, Boston, Mass.

TO SAVE labor and time in the installation of clutch brake disks for buses, at the Arborway garage of the Boston Elevated Railway, an improved type has been devised. A complete circle disk is used on many different types of trucks and buses. Those previously used by the Boston Elevated Railway were complete circles of varying thicknesses, depending upon the type of clutch in which they were used. Replacement required four hours labor on 13-plate clutches and six hours labor on 26-plate clutches. With the type previously used, the transmission had to be removed and the clutch dismantled and reassembled in order to apply the clutch brake disk. It was felt that this required too much labor, and the cost was excessive, so a new type was devised, which has resulted in a material saving in time and cost.



Clutch brake disk for bus equipment

The new disk is made in two parts, which form a complete circle the same as the one-piece disk previously used. It is applied by removing the hand plate between the transmission. Two wires are inserted in the drill holes, as shown in the accompanying sketch. The wire is for the purpose of dropping each half of the disk around the clutch and spindle, and to regulate it so that the male and female halves engage. Then by shoving the clutch pedal out the two parts are pressed together. The time taken for this operation is ten minutes, as compared with four and six hours with the old type.

The workmanship is as good as with the type previously used, and the life of the new disk is as long as that with the old. The cost of the old is 36 cents, and the minimum labor cost for installing it is $3.50, making a total cost of $3.86. The new-type disk costs 60 cents and the labor cost for installing it is 15 cents, which makes the total cost 75 cents. There is thus a net saving of $3.11.

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

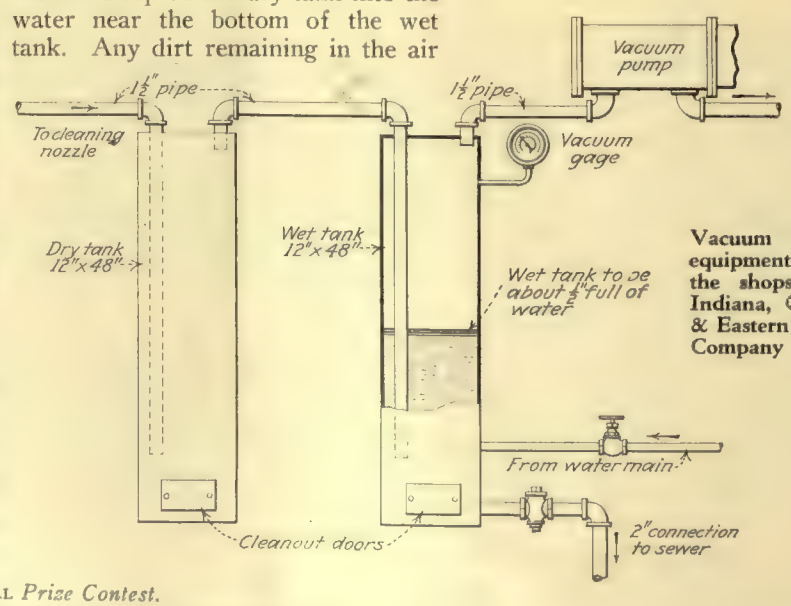
ROLLING STOCK—MISCELLANEOUS—54

Vacuum Cleaner for Car and Bus Seats*

By F. J. Foote
Superintendent of Motive Power and Equipment
Indiana, Columbus & Eastern Traction Company, Springfield, Ohio

TO KEEP plush seats in sanitary condition a stationary vacuum cleaner has been built in the shops of the Indiana, Columbus & Eastern Traction Company, from material on hand, and has been doing good work for years. The vacuum produced is about 10 to 15 in. as measured on a mercury gage. The vacuum pump is simply a 25-ft. air compressor arranged to draw air through the cleaning nozzle and tanks and discharge it to the atmosphere. To prevent dirt from being drawn through the compressor two tanks are used. One is called a dry tank and the other a wet tank. By these dirt from the air is removed before it reaches the pump.

In operation air from the cleaning nozzle is drawn into the dry tank near the center and the bulk of the dirt which it contains drops to the bottom of the tank. Air is drawn from the top of the dry tank into the water near the bottom of the wet tank. Any dirt remaining in the air is washed out by passing through the water. The air then goes to the vacuum pump practically clean. Occasionally it is necessary to clean the dirt out of the tanks, doors being provided to insure easy access to the tanks for this purpose.



Vacuum cleaning equipment used in the shops of the Indiana, Columbus & Eastern Traction Company

**Submitted in* Electric Railway Journal *Prize Contest.*

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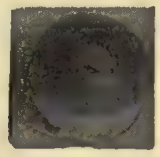
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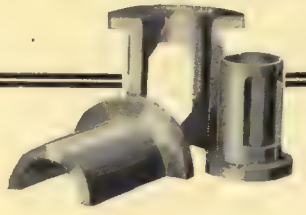
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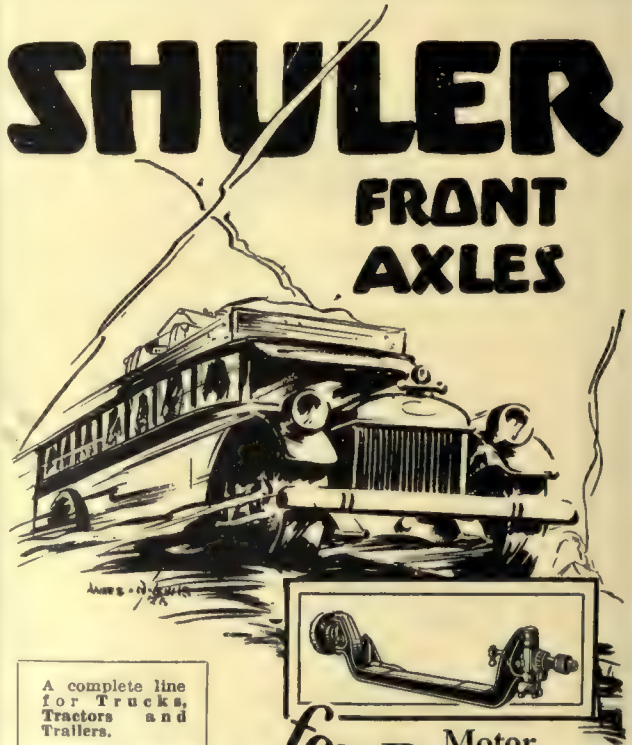
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Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—TRUCKS—36

Making Overhauling of Brake Rigging a One-Man Operation*

By W. J. Hicks
Master Mechanic Virginia Electric & Power Company, Richmond, Va.

WHEN brake beams for trucks were rigged up on the floor of the shop, it was necessary to use a mechanic and a helper because difficulty was encountered in fitting the various parts into position. To permit this operation to be carried out by one man a device was designed in the Richmond shop of the Virginia Electric & Power Company to hold the brake beam in a convenient position.

Any size brake beam can be taken care of on this portable bench. The base of the bench is 29½ in. wide x 48 in. long. An angle iron 3x4 in. extends lengthways on each side. The base or floor is made of 2¾-in. oak boards, which are flush with the side angle irons. The device is provided with four wheels which consist of second-hand Gurney No. 412 ball bearings. These were used previously on the pinion end of GE-258 motors. They are mounted on a wooden axle turned down to fit snugly into the raceway of the bearing. The iron supports are ½x3 in. material and are 30 in. high. Where they come together at the top there is a recess 1½x6 in. to receive the brake beam. This recess for holding the brake beam is fitted with a ¾-in. set screw with a hinged handle. This gives all the advantage of a vise and holds the material in any position.



Portable bench for assembling shoeheads and brake castings to brake beams

**Submitted in* Electric Railway Journal *Prize Contest.*

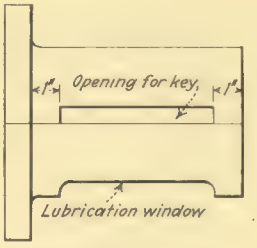
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—61

Key for Axle Bearings Reduces Troubles*

By C. C. Holt
Machinist Bamberger Electric Railroad, Salt Lake City, Utah

HAVING had considerable trouble in keeping axle brasses in place, a key has been adopted by the Bamberger Electric Railroad, Salt Lake City, Utah, instead of the two dowel pins in axle caps. The keys used are ½x½ in. and as long as possible, keeping the ends 1 in. from the end of the brass. The keys are welded in place on one of the half bearings at the edge where the two brasses meet. This method has proved satisfactory for keeping the brasses from turning in the box and shutting off lubrication. Also, breakage of brasses because of loose or worn dowel pins is overcome. A carbon templet is made to fit in the proper place for locating keys, so that when they are put on by electric welding the brasses are interchangeable. An opening on both edges of one of the half brasses is made to accommodate the key, so these are interchangeable.



Method of installing key on axle brasses followed on the Bamberger Electric Railroad

**Submitted in* Electric Railway Journal *Prize Contest.*

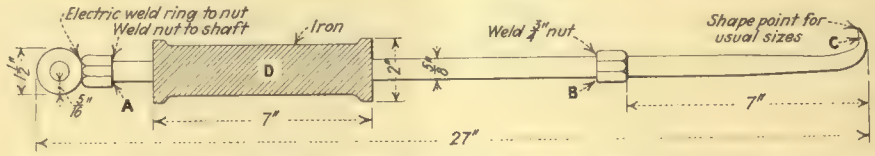
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—TRUCKS—37

Cotter Key Extractor*

By Farrell Tipton
Electrician San Diego Electric Railway,
San Diego, Cal.

COTTER keys, especially the larger sizes, often prove difficult to extract. To facilitate this work the truck department of the San Diego Electric Railway has added a cotter key extractor to its kit of handy tools. This was designed by the foreman of the mechanical department. The tool will do the job in one operation. The hook *C* shown in the accompanying illustration is placed in the eye of the cotter key and the handle *D*, which is free to slide on the shaft, is placed against the stop *B*. A quick jerk on the handle slides it from *B* to *A* and the shock as it comes in contact with the stop at *A* removes the most difficult cotter key. The handle *D* is knurled with shoulders at each end to keep the hand of the workmen from slipping. The neck of the hook *C* is made long enough to reach any cotter key on the trucks. This tool weighs 7 lb. assembled and is used to advantage.



Handy type of tool for removing cotter keys as used in the shop of the San Diego Electric Railway

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

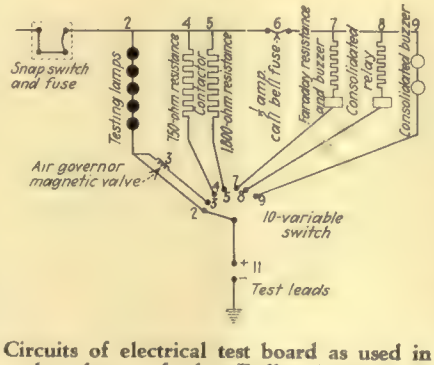
ROLLING STOCK—ELECTRICAL—62

Simple Tests for Electric Car Auxiliaries*

By H. J. Beadle
Electrical Engineer Dallas Railway & Terminal Company
Dallas, Tex.

FOR duplicating conditions as they exist in actual service a panelboard for testing parts of railway car apparatus is used in the shops of the Dallas Railway & Terminal Company. The board has seven circuits with various resistances and equipment installed in each. These include a circuit with testing lamps, another with an air governor magnet valve, two others with resistances for different types of contactors, and three others for buzzers.

For example, in testing a Faraday buzzer, it is installed between the contacts at 11, as indicated on the accompanying sketch. The variable switch No. 10 is changed to point 7. In service there are two buzzers on our cars, one at each end, and in the test as conducted by the board there are two buzzers. One, the permanent buzzer and resistance on the board, and the second, the one under test.



Circuits of electrical test board as used in the shops of the Dallas Railway & Terminal Company

Another example of testing is furnished by the type DB-976 line breakers. They have a 750-ohm resistor in series with the contactor coil when the contactors are first closed. In the test equipment a 750-ohm resistor is a permanent part of the board. The contactor to be tested is connected in the test circuit at 11. There is a difference of potential of 600 volts between the trolley and ground, so the contactor coil can be tested as in actual service. This test board is used frequently in the shops of the Dallas Railway & Terminal Company, and has proved of particular advantage.

**Submitted in* Electric Railway Journal *Prize Contest.*

More Suggestions for

IMPROVEMENTS

in Railway Equipment

RECOGNITION is general that a higher standard of maintenance is necessary to carry out economically the various maintenance operations. Improved tools are needed. Many suggestions for improvements in existing equipment, and for new devices for track line and car maintenance were made in the Nov. 17 and Dec. 15 issues of ELECTRIC RAILWAY JOURNAL. Many more suggestions have been received since that time and some of them are presented here. These suggestions are made as a result of the campaign for better equipment advocated by the executive committee of the American Electric Railway Engineering Association.

To obtain greatest benefit from these suggestions, manufacturers are particularly invited to tell of any equipment which they have that can be adapted to the needs as outlined in these suggestions. Where equipment is not available, manufacturers are urged to develop devices that will supply the want. The men actually confronted with these operating problems are anxious to co-operate in the development of the needed equipment. Suggestions will be published in these columns and maintenance men and manufacturers are invited to enter the discussion. Letters are requested from anyone who has ideas regarding needed improvements in existing equipment, or new devices that should be brought out.

Some Needs for Special Shop Machines

Suggestions by A. T. CLARK
Superintendent of Rolling Stock and Shops
United Railways & Electric Company, Baltimore, Md.

NO DOUBT production in huge quantities by machines has given this country a great advantage in the manufacture of items at such low cost as to make them quite cheap in price. If we think back a few years we will recall the famous dollar watch and today we have before us evidence in the low priced automobile. Both of these products are the result of large production through special machinery. At the present time the American mechanic receives the highest wages of all workers. The reason for this can be found in the use of these ingenious machines that can reduce the cost of manufacture, and permit mass production of the items to compete on most favorable terms with low priced labor. In watches and automobiles, we have but two of the thousands of things where it is possible ot use high priced labor and make low cost articles. The steady rising cost of labor must be offset by improved methods and equipment for performing many of the tasks with labor saving machinery.

IMPROVED SPRAY GUN NEEDED

In reviewing the program of work that is laid before the average superintendent of equipment there are certain items the daily repetition of which could be handled by properly designed machines. One of these is car painting. Already the use of spray guns to apply the paint is meeting with more or less marked success, and it is believed that the time is not far distant when the application of paint materials to surfaces by the old hand method with brushes will be practically discarded. There are, however, certain features with this application of paint by the air gun method that need serious consideration. Spraying of paint by air pressure requires the paint to be atomized highly and then blown upon the surface. The result is that the paint operator works in an atmosphere of finely divided paint that requires that he must be protected from these paint vapors, especially if the paint contains deadly lead fumes or even if it contains the less noxious nitrocellulose vapors.

Already considerable attention has been given to this problem and one prominent electric railway has developed an arrangement whereby cars that are being painted are handled in a portion of the building especially prepared with equipment, whereby air is emitted from the floor and caused to flow upward along the sides at the outside of the car to a suction hood located just above the roof line. In this scheme there is involved considerable costly apparatus and the further limitation that work of this kind cannot be done other than at the particular location provided. If it is necessary to work on a number of cars at the same time large space must be provided and equally large investments must be made for the carrying out of the work.

The writer believes that there are possibilties in a scheme for preventing these vapors from escaping to the surrounding air and that an air gun should be developed that has two air pressures. The lower or inner pressure of the gun would serve to atomize and force out the paint, while the higher or outer pressure would form a conical envelope to keep the paint from spreading by the area predetermined by the design of the gun. Such an arrangement would be simple and the device could be handled easily. It would prevent the paint spray from reaching nearby workmen and parts not to be painted. Also, it would be extremely flexible for the work could be done wherever compressed air was available. It would give an impetus to the use of the spray painting because of the removal of the difficuties encountered with the paint fumes and vapor.

SPECIAL MULTIPLE TOOL LATHE NEEDED

Another problem that officials of electric railways have constantly before them is that of keeping car axles true and to definite size. The usual method in the past has been to turn the axle parts requiring attention in a standard lathe, using but one tool. The standard electric railway car axle, however, has four different points requiring attention from time to time, namely, two truck journals at either end and two center portions where the motor axle bearings are fitted. In addition to this, many companies have a practice of not removing gears until they are entirely worn out. Therefore, when the axle has to be trued, it is necessary to do so with the gear still mounted upon the axle. The writer believes there is a large field for the development of a lathe that will turn the four portions of the car axle simultaneously, thereby reducing greatly the labor involved, and making possible the turning of an axle at $\frac{1}{3}$ to $\frac{1}{4}$ of the present labor cost.

IMPROVEMENTS IN GRINDING AND POLISHING MACHINES NEEDED

In the study of improved car lubrication our company has found that the surfaces subject to contact should be of

the very highest grade of finish, since lubrication can be improved by using lighter viscosity oils. The ordinary surface as it comes from a machine tool has a succession of fine ridges produced by the cutting tool. It is true that cuts can be made very fine and rather close together, thus avoiding to some extent the rougher surface, but under the microscope even these fine ridges are pronounced and their practical elimination means a much better bearing. Therefore, there should be a very large field in the production of machines, either for grinding or polishing, that will produce surfaces having a higher degree of finish without recourse to the present old fashioned methods of turning and subsequent polishing. This is true also of machining the bearings to fit the surfaces. There is a need for machines that will provide a method of turning out bearings for both motors and trucks with a higher degree of finish.

Axles and bearings with a finish of the very highest grade and with improved lubrication, together with the use of lighter oils, will lower power consumption and will, because of the lighter oil and lower friction, result in less bearing wear and cost.

Welding and Grinding Machines for Steel Wheels Should Be Developed

Most large city railways use rolled steel wheels and experience a rapid wear of the flange portion that requires frequent turning of the wheels in special lathes to bring the flange back to standard. This turning reduces the wheel diameter until no more tread material to produce a new flange remains and the wheel must then be discarded. In recent years, the practice of welding and building up the flanges has been developed. Manufacturers have produced welding outfits and have given particular attention to the development of automatic electric welding machines. These have started with a single welding head and through successive developments have increased to four heads. The four-head outfits seem to be the best for welding flanges for a maximum of work can be done with it, consistent with doing satisfactory welding. Several railways have developed grinding equipment to be used with these automatic welding machines. However, there is need for further development by the manufacturers.

Efficient Car Maintenance Requires Many Improved Devices

Suggestions by R. S. Bull
Superintendent of Equipment Pittsburgh Railways, Pittsburgh, Pa.

THERE is need for further development of chemical cleaning tanks for cleaning gear cases, axle caps, truck parts and air brake equipment. Many home made cleaning tanks are in use but manufacturers could develop equipment which would be much better suited for the purpose. Our company could save a great deal through the use of improved tanks.

Improvement in Gear Cases Needed

The present gear cases for railway motors are not satisfactory because they allow dirt and grit to enter between the halves, particularly where they fit around the axle. It seems possible that a dust-proof gear case could be developed which would increase the life of the gears and pinions and exclude the possibility of gear grease getting into axle bearings at the pinion end.

Portable Sand Spray for Removing Rust on Car Bodies

A small portable sand blast which would take care of the exhaust feature by an attachment on the nozzle of the sand spray would facilitate the removal of rust at points on the car bodies where they are scraped or torn while in service. Such equipment would insure better touch-up work in the paint department.

Spray Painting Mask for Car Bodies

An inexpensive, practical method of masking car bodies during spray painting should be developed to speed up the striping operation. Particular attention is being given to facilities for more efficient spray painting by railways and many new devices are needed.

Further Improvements Needed in One-Man Safety Car Equipment

One-man operation of cars provides a field for many improvements. There is a particular need for satisfactory foot-operated, air and electrical equipment for one-man safety cars to relieve the operator of his hand functions.

Equipment for Testing Brake Rods

Suggestions by H. Cordell
Master Mechanic Chicago, North Shore & Milwaukee Railroad Highwood, Ill.

THERE is a particular need for equipment to test brake rods of cars before they are put into service. This would include a tension device which would assure that the rods have proper strength and that welding is without flaws.

There also is a need for a reseating tool for compressor head valves. The tools now manufactured do not do the work accurately.

Many Car Improvements Needed

Suggestions from Frank H. Miller
Vice-President and General Manager, Louisville Railway, Louisville, Ky.

THIS is a time in the street railway industry when the executives and operators must be alive to changing conditions. Existing equipment and facilities in other fields must be applied to the electric railway industry and new facilities and equipment developed, to reduce operating expenses and maintenance and to give to the people the improved service which they demand, and which is due them in return for the higher fares that are now being paid.

Support from the entire electric railway industry should be given to this campaign and its efforts to carry out the suggestion of the executive committee of the American Electric Railway Engineering Association to secure suggestions for needed betterments in methods, practices and equipment.

There are many things that can be improved in car equipment. Car heating, ventilating and lighting is deservedly receiving more attention. Headlights should be made more effective, so as to give proper lighting outside the well illuminated business district. Car painting should be developed, so that it can be applied to either wood or metal and withstand the necessary daily cleaning and still retain its lustre and life. Car motors must now accelerate so that in traffic conditions of the present day, the private automobile will not have too great an advantage.

Great credit should be given the manufacturers for the work done and improvements they have made in these and other items. In certain climates much trouble has developed from the freezing of air brake lines and some satisfactory device other than the present alcohol container should be developed to prevent this interference of service. The present paint spraying machines are not entirely satisfactory, as they waste a great deal of material and the control of the spread is not all that it should be. The street car gong formerly operated by the foot has been replaced to some extent by a gong operated by air. The air gongs now on the market are not entirely satisfactory as the maintenance is high and dependability of the present types is uncertain.

What each railway company really needs is comfortable low-hung, light weight, low priced standard car units, operating as noiselessly as possible along well maintained track and overhead construction, with sufficient passengers at a reasonable fare to permit of proper wages, maintenance and depreciation and return on investment.

Manufacturers!

WE INVITE you to discuss the various suggestions for improving maintenance equipment. What have you to say?

Moderately Priced Portable Asphalt Plant Recommended

Suggestion by W. McK. White
President White Manufacturing Company
Elkhart, Ind.

REFERRING to the need for a small paving mixer for producing cold material, as outlined in the Dec. 15 issue of Electric Railway Journal by Louis T. Botto of the San Antonio Public Service Company, it has been the experience of many users of cold mixed materials for repairing asphalt that this type of mixture will not stand vibration, variations in temperature and heavy traffic as satisfactorily as a hot mixed asphaltic formula, such as a Topeka mix or asphaltic concrete, or a sheet asphalt.

As the San Antonio Public Service Company has to maintain 250,000 sq.yd. of paving, which is growing older and which does not justify an expensive paving plant, I believe that this amount of yardage would justify the use of a moderately priced portable asphalt plant which other users have found can produce hot mixed material very economically. The White Manufacturing Company has a portable asphalt plant which several users have found will save its own cost in from 6,000 to 7,000 sq.yd. of maintenance work, as compared with the prices charged by independent contractors or by municipal plants which sometimes do the work for street railways at about the same price or a higher one than is charged by contractors.

This machine is a complete asphalt plant with rotating sand dryer, pug mixer, measuring devices for all ingredients, oil burners and a bin for storing material. It is mechanically operated with a Continental four-cylinder engine, is self propelling and is mounted on rubber-tired steel wheels. It is a unit made for operation on the streets with a minimum amount of noise and dirt, and does not interfere with traffic; yet it turns out a genuine hot asphaltic mix.

Production costs show that with this machine it is possible to repair asphalt pavements at a cost of from 84 cents to $1.25 per sq.yd. of 2-in. mix, including all labor, material, supervision and other operating costs of the machine. The city of Washington, D. C., and the city of El Paso, Tex., both report costs of 84 cents per sq.yd. Cincinnati averages $1.25 per sq.yd. on hit and miss patching and repair of utility cuts. Little Rock, Ark., saved the cost of its machine in two months, and with a total repair yardage of 8,744 sq.yd. If these machines established records as mentioned, it appears quite economical to employ such equipment where there is an aggregate amount of pavement to care for of 250,000 sq.yd. The machine sells for $6,400 which is about the price of a good motor truck.

Some railways have endeavored to make a hot mix in a concrete mixer with a separate tar kettle and a separate aggregate drier, but the cost of the various units required and the higher costs incurred in operating the separate units and in hauling the hot mix cause the total cost to run higher than that with a compact self contained unit, which will do this work right on the streets and which involves only the hauling of additional stone and sand to refill the storage bins.

Our company also has furnished some electric railway maintenance departments with double-deck heating pans for making a hot mix by hand, using kerosene torches for drying and warming the material, and with separate tar kettle, but this arrangement has been found slow and unwieldy as compared with the use of a unit machine.

Cold Mixed Rock Asphalt Found Satisfactory

Suggestions by Louis T. Botto
Superintendent Maintenance of Way
San Antonio Public Service Company
San Antonio, Tex.

THE San Antonio Public Service Company needs a small mixer to produce a cold mixed asphalt, as outlined in the Dec. 15 issue of Electric Railway Journal, rather than for a machine to turn out a hot mix. For several years this company has been using cold rolled Uvalde Rock Asphalt in its track area with excellent results. This material is mined within 100 miles of San Antonio and is sold there by mine owners and paving contractors.

We can buy three grades of this material on the local market which we classify as follows: (1) Finely ground rock with 10 to 13 per cent asphalt, flux oil added, ready to lay at $9.00 per ton. (2) Finely ground rock with 7 to 10 per cent asphalt, flux oil added—ready to lay at $7.50 per ton. (3) Rock Asphalt screenings, $\frac{1}{2}$ in. to dust, with 15 per cent asphalt—at $5 per ton.

In our new track work we usually lay the pavement in two courses and when finished this is 1½ in. to 2 in. thick, all of the No. 1 type rock. On maintenance work we often lay a 1-in. course of the No. 2 material and then top it off with a ½-in. layer of No. 1 material. For our regular patch work throughout the city, we use different combinations of Uvalde rock asphalt, trap rock or limestone, and Mexican oil, mixed by hand. This constitutes the bulk of our paving repair work and for this purpose we need a small paving mixer very much.

As an illustration of our method of mixing, we spread out on a board, 1 ton of limestone screenings, 1 in. to $\frac{1}{2}$ in. Over this is sprinkled 8 gal. of hot Mexican crude oil of 12 gravity. This is covered with 1 ton of rock asphalt screenings, $\frac{1}{2}$ in. to dust. All the ingredients are then mixed thoroughly. The total cost of this mixture is $3.50 per ton. It is tamped to within ½ in. of the surface and then is topped with a ½-in. layer of the $9 mixture.

Operators!

SEND in your suggestions for new devices that are needed to raise maintenance work to a higher plane. What improvements in present equipment are desirable? If you have experienced difficulty in any line of maintenance work let us know what equipment will help you.

Equipment to Determine Exact Location of Open Circuits

Suggestions by Dwight L. Smith
Electrical Engineer
Chicago Rapid Transit Company
Chicago, Ill.

THE majority of electric railways operating on 600 volts use five lamps in series for their car and station lighting. To locate a bad order lamp in a circuit it is necessary to use the cut and try method of unscrewing one lamp after another until the defective one is found. It appears that it is possible to develop a testing device on the general order of an electroscope, which would show the bad order lamp without the necessity of removing it from the socket.

Somewhat along the same line but of different application is the need for a testing device which would locate the open circuits in the individual wires of lead covered telephone cable. Such a device would be of great assistance.

Splicing Device for Large Cable

To the best of my knowledge there is no device available for splicing stranded cable for overhead use. These sizes are 500,000 circ.mil. and larger. The device should provide full strength of the cable, 100 per cent conductivity and be arranged for application at a cost to compete with hand splicing. Such a splicing device is extremely desirable.

Reel Brake for Stringing Trolley Wire

A satisfactory reel brake combined with a tension device, so that trolley wires can be strung at proper tension, has already been suggested by F. McVittie of the New York State Railways. Our railway also finds a particular need for a device of this kind.

News of the Industry

Fares Lowered in Illinois Cities

Permission was granted the Illinois Power & Light Corporation by the Illinois Commerce Commission on Jan. 9 to lower the rate of its fares on cars and buses in Bloomington, Normal and Decatur. This petition was filed with the commission after the company had been granted permission to raise its rates in those cities among others, whereupon citizens protested and filed with the commission a petition for rehearing. Before the petition for a hearing was acted upon, the company came to an agreement with representatives of the people of the cities in question, the people's petition for rehearing was withdrawn, and the company entered a petition for reduced fares.

Before the rates were raised early in the winter, the fares in Decatur were 6 cents cash with nine tickets for 50 cents; in Bloomington and Normal 7 cents cash with four tickets for 25 cents, cash fare on owl cars 10 cents, books of 100 for $6 and books of 40 for school children at $1.50. In both instances, the rates were raised to 10 cents cash and three tickets for 25 cents.

The new lowered rate, effective Jan. 19, provides that seven tickets can be purchased at the office of the company for 50 cents and 15 tickets for $1.00. Cash fares and tickets purchased on the cars remain at the new increased rate. The company is required to prepare and submit to the commission quarterly reports showing the number of passengers carried under the various rates charged.

In the commission's order it is stated that the supplemental schedule is to be considered temporary and experimental and that the petitioner (the company) should not be prejudiced in bringing "said schedule to the attention of the commission at any time after six months operation from the effective date thereof." It further stated that "the commission especially reserves jurisdiction over the petitioner and the subject matter hereof and the right to reopen this proceeding and to enter such further orders herein as the public interest may require."

Increase on Ohio Interurban—Means Similar Classification

Electric interurban transportation companies have been placed on the same rate level with steam railroads for rate purposes, in a decision just rendered by the Public Utilities Commission of Ohio in granting permission to the Cleveland, Southwestern & Columbus Railway to increase its fares from 3 to 3.6 cents per mile. Steam railroads were permitted to increase fares several years ago, but interurban lines were placed under a separate classification, under which they were denied the right to charge more than 3 cents a mile for passenger service.

In granting the increase the commission declared that unless some immediate relief is extended to the interurban companies, the witholding of the right to collect increased fares and charges will merely hasten the abandonment of the properties of this class. The increased rate allowed the Cleveland company is the same assigned by the Interstate Commerce Commission for all steam railroads.

$20,000,000 Plan for Seattle

Subways, elevated, open-cut lines suggested for articulation with surface lines and buses in effort to give Coast city adequate transportation

IN A COMPREHENSIVE report, which represents two years of general study and one year of intensive engineering research on the part of a group of business men of Seattle, the Seattle Traffic Research Commission recently presented to Mayor Frank Edwards, the City Council and heads of city departments, its plan for giving Seattle a rapid transit system.

The report provides for the expenditure of $15,062,515 for the construction of permanent ways, to include subways, elevated lines and necessary platforms and transfer accommodations and $5,321,400 for rolling stock and rehabilitation of existing lines and street cars. Two general methods of finance are suggested: First, through the operating department by the passengers; and second, through the city, by property owners. The commission found that it was not practicable to expect to meet construction costs from operating revenues.

Subways, elevated lines, depressed lines and many of the present surface car and bus lines would be linked into one vast network of rapid transit facilities with four principal rapid transit routes, to connect with existing feeder lines, as the backbone. These, however, are only the first stage of a wider development which the committee suggests as necessary to bring railway transportation in Seattle to its highest efficiency.

The four routes planned would emanate from a central loop station near the railroad stations at Fourth Avenue and King Street. In addition to the four routes advised, the commission also suggests a line to serve the Rainier Valley district, dependent upon the city's taking over the railway serving that part of the city. This would add approximately $1,200,000 to the estimated cost of the rapid transit system.

The choice of the four routes was based upon four fundamentals: (1) Each unit first into a complete comprehensive city-wide system; (2) they do not disturb existing realty values; (3) they follow natural traffic channels without arterial diversion; (4) they are feasible from an engineering and operation standpoint.

C. D. Pollock, engaged by the commission to conduct detailed studies forming the basis of its suggestions, states that the rapid transit system proposed could be carried to consummation within one year from the letting of contract, and with relatively slight interruption of surface traffic. He advises that the proposed Second Avenue subway be provided by process of steam shovel excavation instead of by driving a tunnel, and so handled that only one block of the street surface would be torn up at a time. He states that a year would be necessary to complete the under-surface work of installing tracks and electrical equipment, constructing stations, etc., but that this part of the program would not interfere with surface traffic.

Under the proposed rapid transit plan, the longest ride from the outlying district to the downtown business section would be 30 minutes, the commission declares. At present the 40-minute zone, which would be done away with, embraces 36 per cent of the city's total area.

The commission's conclusion is that the city has entered into a contract for the purchase of its municipal railways that is "impossible of fulfillment under existing conditions"; that measures looking toward the rehabilitation of the present lines are at best only temporary relief. On this latter point, the report points out that the major part of the rolling stock owned by the city is obsolete and unfitted for modern transportation needs; that while much of the track is in good condition and of a type to permit faster service, a considerable part will have to be rebuilt with heavier rails if satisfactory service is to be maintained. In this connection A. W. Leonard, president of the Puget Sound Power & Light Company, declares his company's willingness to co-operate with city officials in rewriting the purchase contract. He states that he did not

think the company would agree to cutting the annual payments from $833,000 to $300,000 as proposed, but that he could see no obstacle to a figure between these two extremes.

According to the findings of the research commission, the bus, as a city-wide transportation factor, would not be a success in Seattle, on the basis of operating costs alone. The commission estimates that it would require from 1,000 to 1,300 buses to handle the present railway traffic of the city. To substitute buses for street cars would require an immediate capital expenditure of more than $10,000,000; it would be necessary to replace the buses every five years, making a depreciation charge of more than $2,000,000 annually, according to the report. Moreover, the commission believes the traffic congestion problem would be complicated enormously by the use of buses instead of street cars. It recommends that they be considered only as feeders for other forms of transportation into the city, or for cross-city service.

Assessments on District Basis

The commission has also outlined a purely tentative assessment system that would provide a working basis for citizens to consider. To this end the city has been divided into nine districts with estimated average assessment per square foot for financing as follows:

District 1, $0.0058	District 5, $0.1390
District 2, $0.0202	District 6, $1.2620
District 3, $0.0682	District 7, $0.0561
District 4, $0.0794	District 8, $0.0335
District, 9, $0.0145	

Bonds bearings 5 per cent interest could probably be sold at par, the commission believes, to provide funds to carry out the program.

The report also quotes figures showing an estimated saving of $891,742 a year in operating costs with the installation of the rapid transit system. These figures are based on the assumption that the Rainier Valley lines will be taken into the municipal railway system. Under the proposed plan, it is estimated that the rapid transit lines would operate a total of 1,848,730 miles a year at a cost of 24 cents a mile, making a total operating cost of $443,695; to this is added the cost of operating feeder lines a total of 3,900,575 car-miles annually at 30 cents a mile, a total of $1,170,172, or a grand total for the entire system of $4,123,759.

Under existing conditions, the Seattle Municipal Railway and the Rainier Valley Railway operate 16,932,283 car-miles a year, at a cost of 29.6 cents a car-mile for the municipal lines and 30 cents a car-mile for those privately owned, making a total operating cost of $5,015.051, or $891,742 more under the present arrangement than the estimated figure under the rapid transit plan.

Within two days after the report was made public, mass meetings had been arranged for every evening during the following week to examine the plan and discuss its workings. Civic clubs, community organizations, organized groups of business men and property owners are all clamoring for speakers from the commission to explain the system to them.

The report covers 57 pages and contains 60 maps, graphs, blueprints and sketches. The commission held more than 100 meetings to consider the problem and engaged a research engineer, and now has an attorney working on the legislative phases of the plan.

The commission is composed of business men and property owners representing retail merchants, the Central Property Owners and the Seattle Clearing House Association. It is headed by F. A. Ernst as chairman. The commission worked not only without salary, but financed the cost of the research work, purely as a public service, in an endeavor to solve the complex problems of transportation in Seattle.

New York's Militant Police Head Tackles Traffic Tangle

Theater district to be scene of experiment it is hoped will serve as laboratory of observation. Military tactics to be applied

LEND YOUR WEIGHT, BIG BOY!



As the New York American's cartoonist sees it

POLICE COMMISSIONER WHALEN of New York on Jan. 16 began to work out the details of the plan to relieve traffic congestion in the theater zone, originally described as the area bounded by Sixth and Eighth Avenues, 42d and 50th Streets. He discovered that three important revisions were necessary for its smooth operation when it becomes effective on the night of Jan. 21 for a fortnight's trial.

The commissioner said that even then other emergency alterations might be made by himself or any of the twelve police officials he has assigned to help him start the new system, when actual operation of the plan gives them an opportunity to observe its defects.

Revisions in Regulations

Important changes in the plan suggested on Jan. 16 follow:

1. The zone is extended to include the territory between 38th and 52d Streets and Fifth and Ninth Avenues, but only in so far as the no-parking rule and the ban against commercial traffic are concerned. The rule against turning will be enforced only in the originally designated area and then only during the peak of the evening theater rush. The old traffic regulations will be in effect at all other times.

2. The hours during which the no-turning rule will be enforced in the zone between 42d and 50th Streets and Sixth and Eighth Avenues were redefined as from 8 to 9:30 p.m. and from 10:30 to 11:30 p.m. No commercial traffic and no parking of any sort will be permitted in any part of the enlarged zone between 7:30 and 9:30 or 10:30 and 11:30.

3. Buses, originally banished during the congested hours, will be permitted to enter at all times, but during the rush hour will be required to discharge their passengers at the curbstone and continue on out of the section without turning or backing into their terminals. In the hiatus between rushes they may come and go at will. In the late rush they will be allowed to leave at 11:30 or earlier if conditions warrant.

The mapping out of this strategy and the advancing of Mr. Whalen's "anti-jaywalking" bill, which he has said he will ask the Municipal Assembly to pass at an early date, occupied most of the commissioner's day on Jan. 16.

Telephones and Dispatch Riders

The plans adopted by Mr. Whalen for installing the new system of traffic regulation in the theater zone which he expects "to serve as a sort of laboratory in which we can make observations that will be useful in correcting congestion in other parts of the city," savor of military science and tactics.

In the base of the traffic tower at Broadway and 45th Street, Commissioner Whalen will be directing affairs as a sort of field marshal of traffic. Assisting him will be Chief Inspector John O'Brien, as chief of staff. Telephones and dispatch riders on motorcycles will keep them informed of conditions throughout the entire section in which all the traffic experts of the Police Department will be concentrated.

Twelve police booths in addition to the control headquarters where Mr. Whalen will be in command will be set up on the sidewalks at crucial points. Each will fly a police flag, and each will be commanded by an inspector with a corps of assistants and reserves to untangle possible snarls and make emergency regulations as necessary.

Explaining the revisions in the original plan as agreed upon on Jan. 14 at a conference with representatives of the theater and various city departments, at which it was decided to open musical shows at 8:30 and dramatic offerings at 8:50 to "stagger" the peak of the rush.

the commissioner said he had concluded after a more through study that certain details of the scheme were impracticable and would lead to confusion.

If delivery trucks and parking were permitted on the fringe of the congested area, he said, entrance and exit from the experimental zone would be hampered seriously. He thought it unnecessary to enforce the rule against turning, however, except in the territory originally decided upon.

The hours in which the new rules are to be enforced were changed, he said, to allow greater leeway for the going and coming of the crowds and would be more or less flexible, according to conditions.

Lumbering Buses Cause Trouble

He had decided, he said, that most of the trouble caused by the lumbering buses developed from their turning in and out of their terminals. For the present he thought it unnecessary to bar them entirely, although he said such action would follow if it were found that their mere presence interfered with the smooth flow of traffic or if their operators failed to give the co-operation they have promised.

$91,000,000 Subway and Dips Proposed

Detroit Street Railway and Rapid Transit Commission suggest high-speed rapid transit and surface car subway systems. Proposals may go before voters April 1

IN response to requests from Mayor Lodge and resolutions from the Common Council, the Street Railway Commission and the Rapid Transit Commission at Detroit, Mich., have presented a joint report representing their conclusions relative to a proposed rapid transit system for the city of Detroit, recommending the so-called Vernor-Mack subway line for rapid transit with a downtown subway for street cars.

Members of the commissions conclude that the unfavorable economic situation, which caused the withdrawal from the ballot of the last proposal offered by the Rapid Transit Commission, has righted itself and that the city is in a position favorable to the consideration of the new project to be submitted to the voters on April 1. It is the further belief that the rapid transit system should be financed on a pay-as-you-go program, under which all who receive benefits should be made to pay in proportion to the benefit.

The proposed Vernor-Michigan-Gratiot-Mack subway is for train-operated rapid transit on a line 13.3 miles long. It would start at Coolidge Highway west of the Fordson plant of the Ford Motor Company as an elevated line and would continue east on the main street of the Ford plant to Salina Avenue, where it would turn southeasterly to Vernor Highway, west at Woodmere Avenue, continuing thence as a subway in Vernor. After passing the Michigan Central Station, the line would turn southeasterly in Michigan Avenue and proceed thence down Michigan to Campus Martius, crossing under Woodward Avenue to Monroe Avenue, to Randolph Street, to Pingree Square, where it would turn into Gratiot, to Mack Avenue, where it would turn and proceed in Mack to Connors Avenue. There would be 27 stations on this line.

In addition to the Vernor-Mack line, it is proposed to construct a short section of subway 1.16 miles long in Woodward Avenue from Woodbridge to Temple Avenue, to be used for the present street car operation, with portals at Woodbridge and Temple at which the street cars would come to the surface.

This short section of subways and another proposed for Grand River Avenue are designed to remove most of the street cars from the surface in the congested half-mile area downtown. The Grand River section of subway, to be built according to rapid transit specifications, but to be used for street car operation, would be 0.87 miles long, extending from Grand River Avenue West and Elizabeth Street, where one of the portals would be built, in Grand River Avenue to Grand River East and Randolph Street, thence in Madison Avenue east to St. Antoine Street to the proposed easterly terminal portal.

For this Grand River downtown subway, underground loading stations would be built at Capitol Park and at Library Park, connected with each other and with stations on the Vernor-Mack line at Michigan and Shelby Street and at Monroe and Farmer Streets by underground passageways.

It is stated in the report that, by putting underground those lines that are most seriously interfered with by the movement of other rail and motor traffic in the half-mile circle, there will be a double benefit, namely the street car lines that are given an exclusive underground right-of-way free from surface traffic interference, as well as to all surface traffic using the streets from which those street cars are removed.

The estimated cost of the Woodward line constructed on rapid transit specifications with portals at Temple Avenue and Woodbridge Street is $7,500,000; of the subway for street car operation on Grand River, with the underground loading stations, $7,100,000; of the rapid transit lines for rapid transit operation, known as the Vernor-Mack subway, $51,000,000. The equipment for the Vernor-Mack line is estimated to cost $25,400,000, making the total for the proposed systems $91,000,000.

Singly, the proposed rapid transit line would serve about 30 per cent of the entire industrial population and about 22 per cent of the residential population. In combination with the routes of the surface rail system directly connected with it, it would materially better the service now offered to fully 50 per cent of the industrial and residential population of the entire transportation area, the report states.

While awaiting the return of a more favorable economic situation, the Rapid Transit Commission has been engaged in the preparation of a new plan of rapid transit financing. The purposes it has sought to accomplish have been:

1. To bring about a change in the New York Savings Bank Law so as to remove the 7 per cent limitation upon the issue of Detroit's faith and credit bonds, thereby making it possible to borrow on the city's credit temporarily to finance construction.
2. To defer collection of such charge as may be made by the city for special benefit until the end of the construction period, so as to levy upon known enhancement instead of expected enhancement.

The Rapid Transit Commission engaged legal counsel in New York and materially assisted in the drafting of the present New York Savings Bank Law, known as the Mastick Law, which removed the 7 per cent limitation and now permits Detroit to take advantage of those powers under the Michigan State Law formerly denied to it by the New York Law.

The Michigan Rapid Transit Act permits any city to issue faith and credit bonds to the extent of 2 per cent of the total assessed valuation of the city for rapid transit purposes and without regard to any other obligation of the city. Based upon the 1928-29 assesed valuation, this means approximately $70,000,000 available as it may be needed over a five-year construction period. With this amount, permanent way construction may be undertaken on a rapid transit system of approximately 20 to 25 miles of two-track line or lines.

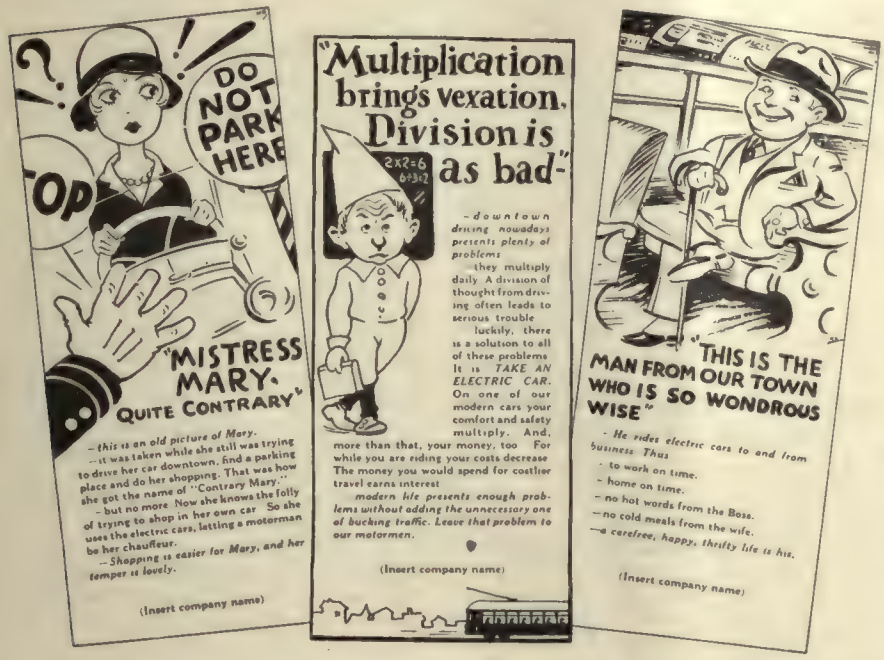
Under the new rapid transit construction plan, it is proposed to build a line or lines within a five-year period from the date of public approval, using the credit of the city, specifically available for rapid transit purposes, in the form of faith and credit bonds, a portion of which may run for 15 years, and to repay these bonds by:

(a) Direct taxation upon the city at large, spread over a ten-year period; beginning upon approval of the line or lines.

(b) A charge made by the city of part of the enhancement in value upon specially benefited property, levied on the ascertained fact that the improvement has increased the selling price of the land; spread over a ten-year period; beginning upon completion of the construction.

Electrification of Lines at St. Paul Proposed

Electrification of the lines of the St. Paul road in Minneapolis and St. Paul and the extension across the Mississippi River from the Ford plant to Minneapolis of its branch railroad line is planned. The proposal will be submitted to city officials of both municipalities this spring.



Three snappy ads from a recent collection—the creation of Labert St. Clair, A.E.R.A. Mats are obtainable

New York Fare Case Again Before Supreme Court

Reargument of the 7-cent fare case was begun before the United States Supreme Court on Jan. 14, when Irwin Untermyer, son of Samuel Untermyer, appeared for the New York State Transit Commission.

This is the second time that the case has been argued. Chief Justice Taft requested the filing of new briefs, and a reargument on the ground that the briefs and arguments submitted last year were too lengthy and were irrelevant. Succeeding briefs have been somewhat shorter, but approximately the same time was allowed for argument.

The Interborough Rapid Transit Company, which sought in the lower courts the right to increase its fares, claims that the contract is confiscatory and therefore in violation of the Constitution.

Baltimore Fare to Go to Court of Appeals

The Maryland Court of Appeals is again to take action in the fare case of the United Railways & Electric Company, Baltimore. Judge Joseph N. Ulman, in Circuit Court, Baltimore, has refused to sign an injunction sought by the United which would vacate and set aside an order of the Maryland Public Service Commission fixing or limiting fare schedules. On another occasion the case was before the Court of Appeals and was remanded to the commission on the valuation issue. The commission fixed the rate of fare at 10 cents cash or four tokens for 35 cents, denying the United's request for a straight 10-cent fare. The company then took the case into court again and dismissal of the supplemental bill of complaint followed. As a result of the latest action the United will carry the case to the Maryland Court of Appeals.

Relief of Burdensome Obligations in Kansas City Proposed

Following a meeting of the industrial committee of the Chamber of Commerce to consider the proposed 10-cent fare of the Kansas City Public Service Company, Kansas City, Mo., it was apparent that that body was averse to the increase, and that it felt the solution lay in relieving the company of some of its special burdens. The committee agreed that such unfair burdens as paying street-cleaning charges and viaduct rents should be lifted. The committee also was favorable to the proposed discontinuance of trunk bus lines, and to the introduction of a speedier and more economical service by reducing the number of stops.

An analysis of the local situation has been made by H. C. Smiley of the Chamber's industrial department, and the report mentions a fare basis of 10 cents with three tokens for 25 cents as the only increase justified at this time.

Hearing on Shop Hour Fares on New York State Line

A further hearing will be held by Commissioner Brewster of the Public Service Commission at the court house in Herkimer on Feb. 4, relative to the recently fixed fares for travel on the New York State Railways between Utica and Little Falls. The hearing will be on the petition of residents of Mohawk, employed in Ilion, asking for a 5-cent fare between Ilion and Mohawk during shop hours.

Fare Consideration Likely

Cleveland Railway succeeds in exacting promise from local council. Subway matters discussed

THE Cleveland Railway, Cleveland, Ohio, has withdrawn its demand for arbitration on establishment of a fare zone system in Cleveland upon a promise of the City Council to consider the proposal made by the company last June to experiment with a zone system for a period of not less than 90 days.

Fortified by legal rulings, the Council was ready to seek an injunction restraining the company from holding the arbitration. The company offered to withhold action on arbitration or an increase from a 7-cent fare to 8 cents for a period of 30 or 60 days, but the Council replied it would not consider a zone system until the company withdrew its demand for arbitration.

While the result appeared to be a victory for the Council, the railway at least succeeded in getting the Council to promise to study a proposal which had been gathering Councilmanic dust for seven months.

Meanwhile a study is being made of the Lakewood franchise to determine if there is any way in which the fare provisions, apparently iron clad, can be broken and Lakewood put in an outer zone, along with East Cleveland, Cleveland Heights and parts of Cleveland.

The Lakewood franchise fixes the rate of fare for a through ride at the lowest rate of fare charged for a ride on any part of the Detroit Avenue line in Cleveland.

But the Lakewood franchise also contains broad provisions for an arbitration on any difference which may arise between the company and suburb. There appears to be no limitation whatever on the subjects which may be arbitrated. Several Cleveland councilmen believe that if a zone plan was adopted so that part of Cleveland bordering Lakewood would be in the outer zone, a sufficient difference as to the rate of fare to be charged in Lakewood would arise to send the matter to arbitration. Much of the opposition to zoning in the Cleveland Council would disappear if Lakewood could be put in an outer zone.

M. F. Bramley, president of the Cuyahoga Subway Company, announced during the week ended Jan. 12 that he did not intend to have any further dealings about subways with Charles H. Hubbell, who recently filed petitions for an initiated subway ordinance in the name of the Cuyahoga Subway Company without Mr. Bramley's consent. Mr. Hubbell announced that the People's Subway Company had been incorporated by some stockholders of the Cuyahoga Subway Company for the purpose of acquiring control of the latter company and obtaining a franchise for it.

Mr. Bramley said that he did not intend to go through with subway plans if the Cleveland Railway and Van Sweringen interests succeeded in arranging their proposed $100,000,000 merger of surface, subway and rapid transit lines.

Varied Program for Central Association

Distribution has just been made of the printed programs for the annual meeting of the Central Electric Railway Association to be held in the Claypool Hotel, Indianapolis, Ind., on Jan. 24-25, 1929. The subjects selected and speakers scheduled are as follows:

THURSDAY, JAN. 24, 1929
CENTRAL STANDARD TIME

9:00 A.M.

Meeting of the Executive Committee

9:30 A.M.

Address of Welcome, by Hon. L. Ert Slack, Mayor City of Indianapolis, Ind.

Address of President, by W. S. Rodger, general traffic manager Eastern Michigan Railways, Detroit, Mich.

Address by J. P. Barnes, president American Electric Railway Association.

"Regulation in Relation to Economic Law," by R. N. Van Doren, vice-president and general counsel Chicago & Northwestern Railway.

2:00 P.M.

"Report of Committee on Pick Up and Delivery of Freight," by H. A. Nicholl, chairman, general manager Union Traction Company, Anderson, Ind.

"The Trend in the Development of Pick Up and Delivery Freight Service," by L. G. Tighe, Northern Ohio Power & Light Company, Akron, Ohio.

Discussion, led by J. M. Pogue and F. D. Norviel.

"Advantage of Freight Consolidation," by D. R. Thomas, president Electric Railways Freight Company.

Discussion, led by G. K. Jeffries and A. H. Gossard.

7:00 P.M.

Association Dinner and Dance Riley Room, Claypool Hotel (Dress Optional)

Address by Hon. Huston Quinn, vice-president Louisville Trust Company.

FRIDAY, JAN. 25, 1929

9:30 A.M.

"Traffic Analysis and Schedule Making," by J. R. Ong, transportation engineer Cincinnati Street Railway, Cincinnati.

"Signals on the South Shore Line," by B. L. Smith, superintendent of signals Chicago, South Shore & South Bend Railway, Michigan City, Ind.

"Interurban Operations—Possible Economies and New Methods," by C. T. Dehore, president Indianapolis & Southeastern Railroad, Indianapolis, Ind.

REPORTS OF COMMITTEES

Safety—James Harmon, chairman.
Finance—H. A. Nicholl, chairman.
Power distribution—J. O. Pennisten, chairman.
Membership—J. M. Pogue, chairman.
Supply men—E. H. Arnott, chairman.
Auditing—Tudor W. Jones, chairman.
Track and roadway—R. J. Custer, chairman.

REPORTS OF AFFILIATED ASSOCIATIONS

Central Electric Railway Master Mechanics Association, by F. J. Foote, president.

Central Electric Railway Accountants Association, by F. A. Healy, president.

Central Electric Traffic Association, by L. E. Earlywine, chairman.

Election of Officers.

Meeting of the Executive Committee.

The Accountants Association, which meets jointly with the parent association Friday morning, will continue its sessions in the afternoon and on Saturday, the 26. Special features scheduled for these sessions follow:

FRIDAY, JAN. 25, 1929

2:00 P.M.

Address of the President, by F. A. Healy, auditor Indiana, Columbus & Eastern Traction Company, Springfield, Ohio.

"Facts and Figures," by James P. Longon, vice-president and treasurer Franklin Bond & Mortgage Company.

The Agenda.

SATURDAY, JAN. 26, 1929

9:00 A.M.

REPORTS OF COMMITTEES

Election of Officers.

Selling the Service Topic for New York Association Meeting

Many interesting subjects are scheduled for the midwinter meeting of the New York Electric Railway Association to be held in the Hotel Commodore, New York, Jan. 22, as follows:

"Custom Built, Ready to Use Service," by R. R. Hadsell, general superintendent of transportation New York State Railways, Rochester, N. Y.

"Service Worth Buying," by W. E. Wood, president Virginia Electric & Power Company, Richmond, Va.

"Modern Equipment Convinces the Public," by George Frey, general sales manager J. G. Brill Company, Philadelphia, Pa.

"Redesigning Present Equipment," by J. B. Hayes, general superintendent transportation Virginia Electric & Power Company, Norfolk, Va.

"Electric Equipment and Brakes," by A. J. Manson, traction apparatus manager Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; J. C. Thirlwall, General Electric Company, Schenectady, N. Y., and John F. Craig, assistant eastern manager Westinghouse Traction Brake Company, New York, N. Y.

"Efficient Employees and a Satisfied Public," by R. S. Tompkins, assistant to the president United Railways & Electric Company, Baltimore, Md.

"Relations with Public Authorities," by Hon. Norman A. Boyd, Mayor City of Binghamton, N. Y.

Buffet luncheon will be served at the Commodore at noon and the annual dinner will be held there also at 7 p.m. William E. Thompson, president of the association, will act as toastmaster and the speaker of the evening will be Hon. Arthur E. Sutherland.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 22*—New York Electric Railway Association, midwinter meeting and dinner, Hotel Commodore, New York, N. Y.**

***Jan. 23-25*—Electric Railway Association of Equipment Men, Southern Properties, and Southwestern Public Service Association, Mechanical Division, joint meeting, Houston, Tex.**

***Jan. 24-25*—Central Electric Railway Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Local Transportation Discussed in Kentucky

An electric railway man succeeded an electric railway man as president of the Kentucky Association of Public Utilities at the twelfth annual meeting ended Jan. 16, when W. H. Harton, general manager of the Cincinnati, Newport & Covington Railway, was elected president to succeed Samuel Riddle, vice-president of the Louisville Railway. Mr. Harton was elevated from the vice-presidency.

In his annual address, President Riddle discussed among other things electric railway and bus operations, quoting the figures of the Department of Commerce through Dec. 31, 1927, on growth and development of utilities, showing reduced mileage of street railways, but increased car-miles. Mr. Riddle held that there had been but little change in Kentucky other than the addition of bus departments to electric railways. He also told of the work of a committee headed by Lieut.-Gov. Breathitt, under a resolution of the last State Legislature to make a survey of the utilities of the state, and suggest remedial legislation if needed. Information for the use of this committee is now being compiled. A new service bulletin for the use of the press was abandoned on Feb. 1, 1928, and Robert Montgomery of the Louisville Gas & Electric Company made chairman of a special committee to issue utility statements when and as wanted.

Other officers elected were: First vice-president, L. B. Herrington, president of the Kentucky Utilities Company, Louisville; second vice-president, M. C. Funk, Kentucky & West Virginia Power Company, Ashland, Ky.; treasurer, A. A. Tuttle, vice-president and treasurer, Kentucky Utilities Company; secretary, E. F. Kelley, secretary to president Louisville Railway.

Recent Bus Developments

Taxis Sold by Twin City Rapid Transit

The Yellow Cab Company, for two years a subsidiary of the Twin City Rapid Transit Company, Minneapolis, Minn., operating 300 taxicabs in the Twin Cities and Duluth, Minn., has been taken over by a new company headed by Paul W. Tibbetts, of the Twin City & Southern Bus Company. An unusual feature is that two well-known women of Minneapolis are on the new board of directors. Among the other members of the board are C. E. Wickham, president of the Northland Transportation Company, bus operator for the Great Northern Railroad; John Junell, attorney for the Twin City Rapid Transit Company; Ivan Bowen, former member of the Minnesota Railroad & Warehouse Commission and counsel for a bus company, and C. B. Goodsell, who has operated the Yellow Cab Company for the street railway.

T. Julian McGill, vice-president of the Twin City Rapid Transit Company, indorsed the statement by Mr. Tibbetts that, when the Twin City Company bought all the larger taxicab companies, the intention was to put operation of transportation facilities under one directing head, but it was found the taxicab business was not essentially a competitor of street railway service. "Furthermore," said Mr. Tibbetts, "due to a chaotic condition of the taxi situation in the city, it involved attention, effort and financial hazard out of all proportion to the value of the service as an auxiliary to the railway business."

Prospects Appear Good for Interstate Bill

Indications are that the interstate commerce committee soon will recommend the interstate bus bill to the House for action. A report has been received from the Interstate Commerce Commission, approving the main features of the bill but recommending certain changes in the measure. Despite this it is the opinion of Representative Parker of New York, chairman of the committee, that these modifications can be agreed upon without the necessity of further hearings.

Mr. Parker added that the only section of the bill over which there is still not an entire agreement among all interested parties, is the so-called "Grandfather clause." This provides that all interstate motor carriers in service on Nov. 1, 1928, shall receive certificates as a matter of course under the operation of the act.

The report on the bill received from the Interstate Commerce Commission was written by Commissioner McManamy. It lays special emphasis on the advisability of establishing basic principles for the guidance of the commission in deciding when public convenience requires bus service between interstate points. In this connection, the report states:

> The question as to whether public convenience and necessity require the operation of a motor passenger line between points already adequately served, in so far as steam railroads or street or interurban electric railways are fitted to render adequate service, involves what are to us entirely new principles. In view of the direction that reasonable consideration shall be given to existing available transportation agencies and service, a construction should be adopted which would exclude motor competition in a field already enjoying good railroad or electric railway service.

The report also recommends that the language of the bill referring to the matter of reasonableness of rates be clarified to show whether or not it is intended to have the commission make decisions on rate matters. Under section two (e) it is suggested that the point be cleared up whether or not decisions rendered by the board will have to be unanimous.

Substitution Situation Reviewed

Interesting review of transportation situation in New Jersey contained in report of utility commissioners

IN ITS report for the year ended Dec. 31, 1928, to Harry Moore, Governor of New Jersey, the Board of Public Utility Commissioners explained at some length the status of electric railway and bus operation in that State. The board says extensive traffic checks and surveys in the railway field have been made from time to time, both on the board's initiative and on the investigation of complaints, and appropriate action has been taken on all these matters. The experiment of rehabilitation by several of the companies of a number of cars to provide greater comfort and a more attractive appearance has been continued with good results both with the public and the operators. In addition, the board lists several other improvements made by railways in connection with this equipment. A feature of considerable importance from the standpoint of safety was introduced by the Public Service Co-ordinated Transport on the viaduct connecting Jersey City Heights with the Hoboken terminal. Here an automatic signal system provides for the fixed spacing of cars operating in both directions, thus providing a considerable factor of safety in operation.

On the substitution of bus service for electric railway service, the report refers to the efforts made by the Public Service Co-ordinated Transport on several of its routes and also the Morris County Traction Company and the substitution by the Trenton & Mercer County Traction of buses on two of its routes of lighter traffic. The Five-Mile Beach Electric Railway was authorized to substitute buses for the entire railway service. The Public Service Rapid Transit Company, formerly the North Jersey Rapid Transit Company, and the Atlantic City & Shore Railroad are also mentioned, and the Coast Cities Railway is substituting buses for trolley service on one or more of the routes. Considerable space is taken up in the report with the explanation of bus situation and the authority of the board to supervise and regulate the operation of quasi-public enterprises, commonly called public utilities and specifically so defined in the acts creating the Board of Public Utility Commissioners which was amended in 1911. The board says it has been its aim to assist in the legitimate development of bus traffic and to prevent unnecessary and uneconomic operation. In doing this it is frequently necessary for approval of the local consent to be accompanied by restrictions imposed on operation in parts of territories already adequately supplied with transportation facilities. The extent of the development of the bus traffic is evidenced by the fact that nearly 2,800 buses are in operation on approximately 360 routes.

The number of independently owned auto buses has decreased. The Public Service Co-ordinated Transport continues to be the largest operator of buses in the State. This company has in scheduled use more than 1,400 buses.

The use of the de luxe or parlor car type of bus has been extended to a considerable degree.

The bus has been substituted for the trolley in a number of instances. Some of these cases were where the condition of street railway tracks has been such that extensive repairs were needed, and in others the substitution was made because of light traffic. An example of complete substitution of service by bus for street railway service on local lines in a city of more than 150,000 is to be found in Paterson.

The board mentions as another reason for the substitution of buses for trolleys, the development of larger types of buses which appear to handle the traffic more adequately.

A survey of the state indicates that the operation of buses has been a means not only of furnishing service through a comparatively small investment in newly developed territory, previously without adequate means of transportation, but has assisted in many instances in the development of the municipalities themselves.

The report indicates the unsatisfac-

tory conditions surrounding the operation of interstate buses. These are due to the limited scope in which authority of the State may be exercised over interstate commerce. The board has joined with the commissions of other states in urging Congress to enact a law which would subject interstate bus operators to regulation similar to that to which other interstate operators are required to submit.

Hearing on Equitable Coach Goes Over

The committee of the whole of the board of estimate of New York held a hearing on Jan. 14 on the Equitable Coach Company-B.-M. T. bus merger, but took no action. Mayor Walker left for Washington before that item was reached on the calendar, so consideration of the Equitable petition for an amendment to its franchise was put over until Jan. 21.

Cornelius M. Sheehan, former deputy commissioner of water supply under John F. Hylan, denounced the merger as illegal, asserted that the Equitable had forfeited its franchise by not complying with its terms and called for denial of the petition for an amended franchise and for reopening of the entire subject.

A. H. Merz, a representative of the Harvey non-Partisan Taxpayers' Association of Queens also assailed the project. Herman A. Bayern, vice-president of the Union Bus Corporation, which was an unsuccessful bidder for the franchise, attempted to get a hearing for his own company. Aldermanic President McKee, presiding for the Mayor, suggested that it was not the time for such discussion.

Leonard M. Wallstein, counsel for the Citizens Union, was on hand with a memorandum calling for forfeiture of the Equitable franchise but he delayed submitting it. Counsel for the Equitable and the B.-M.T. were also present but had nothing to say.

The franchise, if amended, would provide for splitting up the original franchise and permit the merger with the B.-M.T. whereby the B.-M.T. would take over the Brooklyn and Queens routes. The routes in the borough of Manhattan would be handled by a new company controlled by the Equitable.

Improved Service on Buffalo Line

Through bus service was started recently by the International Bus Corporation, a subsidiary of the International Railway, Buffalo, N. Y., on the Delaware Avenue-Kenmore-Tonawanda line, thus eliminating the transfer junction at the Kenmore Village line. Heretofore, the Tonawanda buses stopped at the Kenmore Village line and connected with the city buses of the Delaware Avenue line at that point. No change is made in the rate of fare or the fare limits.

Financial *and* Corporate

Improvement in Youngstown

Earnings of the Youngstown Municipal Railway, Youngstown, Ohio, for the eleven months of 1928 are the best the company has enjoyed since the service-at-cost franchise was adopted ten years ago. According to Traction Commissioner Engle, the railway earned an average of 5.18 per cent for the first eleven months of 1928 and 6.13 per cent in November.

Gross revenue for November was $177,198, an increase of nearly $28,000 over November, 1927. The net profit was $23,533 which failed by $3,331 to produce the full 7 per cent return to which the company is entitled, if earned.

There were 2,633,072 passengers carried, an increase of 213,000 over the previous November. The mileage of street cars and buses was 472,521, an increase of 10,000 over November, 1927.

Missouri Electric Acquired by St. Louis Company

The Missouri Public Service Commission on Jan. 12 authorized the St. Louis Public Service Company to take over all of the assets, franchises and property of the Missouri Electric Railroad operating between Wellston and St. Charles, Mo. The St. Louis Public Service Company owns all of the $1,000,000 stock issued by the Missouri Electric and holds all of its $700,000 in outstanding bonds, with a claim for accrued interest totaling $361,666. All other liabilities of the Missouri Electric will be assumed by the St. Louis company. The claims of the St. Louis Public Service against the Missouri Electric will be concelled.

Another Liquidating Payment by Toronto Railway

According to the Canadian *Financial Post*, the Toronto Railway, Toronto, Ont., expects to make a final payment of 50 or 60 cents a share within the next month or six weeks. A total of $115.50 per share already has been paid.

The railway has had $60,000 tied up with the Niagara Park Commission. The commission refused to release the money until a claim against it by the city of Niagara Falls had been settled. The suit was settled and a city by-law passed last November relieving the commission of the claim. The formalities are expected to be cleared away within a few weeks.

The Electric Development Company, a subsidiary of Toronto Railway, years ago made a deposit with the commission guaranteeing the commission against damage to concessions in the process of some electrical work going on within the park area. The time for filing the claims expired ten years ago, but the case of the city of Niagara Falls has been hanging fire since.

The Toronto Railway has been in process of liquidation since the purchase of its lines some years ago by the city of Toronto.

$2,500,000 Montreal Issue Offered

Aldred & Company, Ltd., and a syndicate including Wood, Gundy & Company, Ltd., Hanson Brothers, Inc, and Greenshields & Company are offering $2,500,000 series "C" 4½ per cent general and refunding mortgage sinking fund gold bonds of the Montreal Tramways at a price of 90½ yielding more than 5.15 per cent.

The Montreal Tramways serves a population of about 1,200,000. It operates under a franchise with the city of Montreal which provides that the company is entitled to an annual return, alter all operating expenses, maintenance and depreciation, of at least 6 per cent on the capital value of the company's property as fixed through the franchise contract. After these allowances to the company, the city of Montreal receives an annual rental of $500,000 and a stipulated percentage of surplus earnings. For the fiscal year ended Dec. 31, 1928, (December estimated) gross earnings are shown at $13,940,000, and after operating expenses, taxes and maintenance, net earnings of $3,693,000 are equivalent to about 1.7 times interest requirements on all bonds of the company outstanding, including the present issue.

Under a special arrangement made with the city of Montreal and approved by the Montreal Tramways Commission, the company in the year 1925 started bus service and now operates over thirteen different routes. This service has proved very successful and there are now in operation 96 buses, 28 of which were placed in service during the past year. The number of passengers increased from 5,370,475 in 1926 to 14,197,992 in 1928 (December estimated).

Co-ordination in Indiana Effective

Co-ordination of the operations of the Interstate Public Service Company, subsidiaries of the Midland Utilities Company and subsidiaries of the Central Indiana Power Company through centralized supervisory management was announced on Jan. 2. The railway companies involved are the Indiana Service Corporation, Chicago, South Shore & South Bend Railroad, and Gary Railways, subsidiaries of the Midland Utilities Company, operating in the northern part of the state, and the Interstate Public Service Company, operating chiefly in the southern part of the state.

Operation of these companies will be co-ordinated under centralized management through the Midland Utilities Investment Company of Chicago. The operating companies will not be merged but will continue to be run as units.

E. Van Arsdel, president of the Interstate Public Service Company, and L. B. Andrus, president of the operating subsidiaries of the Central Indiana Power Company, will continue in charge of the operations of the respective properties.

Co-ordination of the operation of the Interstate Public Service Company and the subsidiaries of the Central Indiana Power Company, previously controlled by the Middle West Utilities Company, will be effected under the direction of Samuel Insull, Jr., president of the Midland Utilities Investment Company and Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne. Subsidiaries of the Midland Utilities Company will continue to be operated as in the past under the direct supervision of Mr. Insull, Jr.

Charles W. Chase, president of the Gary Railways, commenting upon the re-allocation of the properties, said that there would be no change in the local situation as it relates to the Gary Railways. He added that, by considering the state as a whole, a more comprehensive program could be developed.

$300,000 West Towns Issue

There was offered for subscription in December, 1928, by the Harris Trust & Saving Bank, Chicago, Ill., an issue of $300,000 of Chicago & West Towns Railway first gold 6's series B. The bonds, dated July 1, 1927, and due July 1, 1932, were priced at $96.75. They are secured equally with $1,500,000 Series A 7's, due 1932, by a direct first mortgage on the entire property.

8,600,000 on Chicago-Joliet Line

The Chicago & Joliet Electric Railway and its subsidiary, the Chicago & Joliet Transportation Company, last year carried 8,600,000 passengers, according to the annual report of W. H. Heun, general manager. Since its start on Aug. 15, 1928, the Chicago-Joliet bus line carried 23,419 passengers and the Joliet bus lines 913,488 passengers. City railway lines in Joliet carried 5,410,804 passenger and interurban lines, 2,317,673, a total electric line traffic of 7,728,477 passengers. The totals show a decrease of 390,967 from 1927.

Negotiations Under Way for Springfield Property

It is understood that the Cincinnati, Hamilton & Dayton Railway, Dayton, Ohio, in connection with its recent acquisition of the Indiana, Columbus & Eastern through Springfield, Ohio, is looking into the possibility of acquiring the Springfield Street Railway. Nothing definite has resulted and it is still unsettled whether or not anything will be done.

Traffic Increases in Alliance

New records were established by the Stark Electric Railroad, Alliance, Ohio, during 1928, with an increase of more than 250,000 car-miles and approximately 400,000 passengers compared with 1927. Last year, according to officials of the company, cars operating between Canton and Salem, Ohio, a distance of 35 miles and over a 2-mile city route in Alliance, traveled 1,294,574 miles, carrying 2,932,012 passengers. In 1927, cars traveled 1,028,941 miles and carried 2,555,506 passengers.

In this distance, there was not an accident fatal to either passengers or employees. A few minor accidents resulted in slight injury to employees.

Loss on Rochester's Subway

That operation of passenger service by the New York State Railways on the city-owned subway in Rochester, N. Y., is detracting from the revenues of the surface lines is shown in an analysis of the annual report of Commissioner Charles R. Barnes. The first seven months' operation of the subway showed an operating deficit of $8,123, more than double the original estimate. The report bears out estimates that only 10 per cent of the subway passengers would be new riders, the other 90 per cent drawn from users of the surface cars.

It is estimated that in the first seven months of operation, approximately 697,000 former surface line passengers used the subway, representing a loss of about $55,800. The three surface lines whose territory interlaps that of the subway—the Monroe, Park and Goodman—showed the greatest decrease in patronage. On the other hand, lines farther from the subway were unaffected.

Slight Decline in Passengers Carried in Springfield

Electric cars and buses of the Springfield Street Railway, Springfield, Mass., were operated more than 7,150,000 miles in the fiscal year 1928, an increase of about 50,000 miles over 1927. Passenger traffic declined about 4 per cent, the decrease, however, being only one-third as great as in the preceding year. Payrolls in 1928 represented a cash outlay of approximately $1,600,000, compared with $1,700,000 in 1927. Equipment at the close of the fiscal year 1928 included 153 cars and 47 buses, as against 165 cars and 38 buses a year ago.

Decrease in Ten Months' Net in Providence

A decrease of slightly less than 11 per cent in the net income for October, compared with October, 1927, is shown in the report filed with the Public Utilities Commission by the United Electric Railways, Providence, R. I. Net income for last month was $38,839, while for October last year it was $43,532. Total operating revenue of $617,314 for last October and total operating expenses of $497,630 were reported, showing decreases of about 4 per cent in comparison with the figures of a year ago. Addition of $5,858 non-operating income brings the total income for the month to $125,542, or 5½ per cent below the figure for October, 1927.

Increased Needs of Puget Sound Subsidiary

An increase in the capitalization of the North Coast Transportation Company, a subsidiary of the Puget Sound Power & Light Company, Seattle, Wash., from $60,000 to $600,000, is explained by F. W. Brownell, comptroller of the two companies, as signifying an effort to bring the capitalization of the company more in line with its investment in transportation equipment. Mr. Brownell states the company has grown until its investment in equipment now approximates $1,000,000, covering both bus and track lines. Increased bus service between Seattle and Tacoma since the closing of the interurban of the Puget Sound Electric has demanded additional equipment, he states. The North Coast Company has also established a half-hour stage service between the two cities, increasing the number of trips between Tacoma and Seattle from 17 to 30 a day.

Questions Financial Move in St. Louis

Judge Henry S. Priest, counsel for minority stockholders of the St. Louis Public Service Company, filed a brief with the Missouri Public Service Commission at Jefferson City on Jan. 12 in opposition to the application of the City Utilities Company of New Jersey for permission to buy and hold more than 10 per cent of the stock of the railway. He charges that the New Jersey company is owned by two New York corporations, the North American Company and Newman, Saunders & Company, Inc. He based his statement on information furnished to the state commission by one of its accountants who was permitted to examine the books of the New Jersey corporation after attorneys for the company had declined to present the records at a public hearing for examination by Judge Priest.

City Utilities now owns 10,725 shares of the preferred stock of the St. Louis Public Service Company and 28,772 shares of common stock and has agreements to purchase 84,265 more shares of common. The company would then hold 38 per cent of the outstanding stock.

Judge Priest has questioned the motives of City Utilities Company in seeking to provide managerial and financial service and advice to the railway. City Counselor Muench has filed his final brief opposing the City Utilities application.

Personal Items

B. J. Jones Resigns from Lima Properties

At the annual meeting on Jan. 8 of the Lima-Toledo Railroad and the Lima City Street Railway, Lima, Ohio, the resignation of B. J. Jones as president of the former property and vice-president of the latter was made final. This change was occasioned by the sale of the properties to the Cincinnati, Hamilton & Dayton Railway. Other changes were effected by the election of the following:

John L. Cable, attorney of Lima, president of both companies;

F. A. Bundy, vice-president;

C. E. Baker, secretary-treasurer;

J. H. McClure, general manager of the Cincinnati, Hamilton & Dayton, director.

Mr. Jones was appointed receiver of the Ohio Electric Railway System on Jan. 25, 1921, and, since the receiver's sale in 1922 to the bondholders, the companies have been operated under his direction as general manager. Under the planning of Mr. Jones, more than $500,000 has been spent in rehabilitating the properties, and in the purchase of modern city cars for use in Lima—freight equipment, track and overhead line construction, also physical connection with the Community Traction Company at Toledo, so that interurban passenger cars could operate to the uptown union passenger station and freight business be exchanged with interurban lines for Detroit, Cleveland and other points. This business has grown from a few cars of freight to 55 and more loaded freight cars each week day. The improvements have resulted in earnings from operation of $1,330,000 during the past eight years. They offer tangible tribute to the sagacity of operation under Mr. Jones and reflect alertness on the part of both the management and the men to the opportunities which intensive cultivation of traffic of this kind affords.

New Assignments in Alliance

The appointment of Everett W. Sweezy, former general manager of the Stark Electric Railroad, Alliance, Ohio, to be vice-president of that company and the Alliance Power Company to succeed Howard Morris, New York, is listed in a group of changes. Other changes are as follows:

C. E. Sperrow, general manager of the Suburban Light & Power Company, assumes the duties of general manager of the Stark Electric and the Alliance Power in addition to his other work.

O. K. Ayers, auditor of the Stark Electric and the Alliance Power, becomes treasurer, succeeding Mr. Sweezy.

W. H. Grimes becomes auditor, succeeding O. K. Ayers.

Ralph Miller, formerly in charge of overhead and equipment, has been named general superintendent of the Stark Electric, in charge of transportation and roadway.

Attorney C. M. Shelter, Canton, who has been representing the Stark Electric in its court battles, has been named general counsel for the Suburban Light & Power Company, the Utilities Service Company and affiliated organizations which include the Stark Electric and the Alliance Power. He will maintain an office in Canton, the county seat, and will devote his entire time to legal affairs of the organization.

A. W. Robertson Made Westinghouse Chairman

Head of Pittsburgh Utilities is chosen to succeed Guy E. Tripp. Has been president of Philadelphia Company since 1926



A. W. Robertson

ANDREW WELLS ROBERTSON, Pittsburgh, was elected chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, at a meeting of directors held in New York on Jan. 16. He succeeds the late Guy E. Tripp. Paul D. Cravath has been acting chairman pending the election. Mr. Cravath will remain a director of the company.

Mr. Robertson is now president of the Philadelphia Company of Pittsburgh. He will withdraw from this and other business activities and devote his entire time to the Westinghouse Company. His official headquarters will be in Pittsburgh, for the present, where he has long been prominent in public utilities.

Mr. Robertson was elected president of the Philadelphia Company in 1926, after serving for several years as vice-president of that company in charge of public relations, and has been at the head of the institution since it was acquired by the Standard Power & Light Corporation early in 1926.

Certainly Mr. Robertson was well qualified, both by training and experience, to head the utility companies serving Pittsburgh and vicinity when he was designated for that post in 1926. A resident of Pittsburgh for twenty years, he has been in close touch with the development of the greater Pittsburgh district. His experience as an executive of the Philadelphia Company dates back to 1913. As vice-president in charge of public relations he had been in touch with nearly all operations and in direct charge of the general service departments, which maintains all relations with domestic customers of the company, the adjustment or claims department, the advertising department, and relations with the public service commission. And this very experience makes him unusually conversant with all phases of the public utility industry, from which the Westinghouse Company derives the bulk of its business.

A statement issued by the executive committee of the Philadelphia Company, with reference to Mr. Robertson's retirement as president follows:

Mr. Robertson is leaving our organization with our entire good-will and our sincere wish for the greatest of success as chairman of the board of the Westinghouse company. His long association with the Pittsburgh utilities has been most valuable in the upbuilding of these great properties and their management. We regret to lose him, but are glad that the opportunity now presented for the wider exercise of his ability will not take him away from the city with which he has been so closely identified. As president of the Pittsburgh utilities, Mr. Robertson has filled a position of great responsibility, and he will go to the Westinghouse company splendidly equipped for new achievements in the career of one of Pittsburgh's foremost industrial enterprises. A successor to Mr. Robertson will be elected at a meeting to be held in the near future.

The new Westinghouse chairman is only 49 years old. He is of Scottish parentage, and was graduated from Allegheny College, Meadville, Pa., in 1906. He received the degree of LL.B. from the Law School of the University of Pittsburgh in 1910, and after practicing law in Pittsburgh became general attorney of the Philadelphia Company, which, with its affiliated companies, operates all of the electric light and railway properties and most of the gas properties in the Pittsburgh district.

L. S. Storrs Named Executive Chairman of Baltimore Board

Managing director of American Electric Railway Association selected by directors of United Railways & Electric Company for important post there. Expected to accept

TO LUCIUS S. STORRS, managing director of the American Electric Railway Association, has been tendered the position of executive chairman of the United Railways & Electric Company, Baltimore, Md., operating 437 miles of city and suburban railway. Announcement to that effect was made in Baltimore on the afternoon of Jan. 17. No other changes in the existing Baltimore organization are contemplated.

It is understood that Mr. Storrs is disposed to accept the appointment, but only on the condition that an arrangement be made under which the work he is now doing for the association shall be not interrupted pending the selection of a successor to him with the association. Naturally the directors of the company at Baltimore would prefer to have him devote his full time and attention to the problems of their company at once, but it is understood they are prepared to defer to this reservation, knowing full well the obligation of Mr. Storrs to the association and appreciating that a man in his position has commitments which can not well be laid down at once. Mr. Storrs put the matter this way:

I have been in conference with the Baltimore people, and I am much attracted by their offer. I am going West now, to be away five weeks, to carry out an engagement made some months ago to survey some properties for the Southern Pacific Railroad.

Frankly, I am attracted to the position by the obviously great future of the city, the excellence of the property and the problems before the railway in Baltimore. That city is growing rapidly. Its industrial development in recent years has been remarkable. Within the last few weeks the Western Electric Company has decided to locate a plant there which will employ men sufficient in number to comprise a small city in itself. I also understand many other industries contemplate the location of plants in Baltimore. All this means growth in the need for adequate transportation facilities.

If I can make the necessary arrangements in my affairs I am strongly inclined to accept. At the earliest possible date I shall make a further statement of my plans.

Four years ago next April Mr. Storrs began to apply to the work of the American Electric Railway Association as managing director his vast experience in electric railway executive positions and the management skill which the directors of the company at Baltimore so signally recognize now. To that post he went from the Connecticut Company, in the direction of which the problems he met are not different from those which now confront the United Railways & Electric Company. This is plain since the special committee of the



Lucius S. Storrs

Advisory Council of the American Association that selected Mr. Storrs for the position he now holds made its choice largely on the basis of the fact that he had been successful in giving expression in his own company to furthering the recommendations of the Federal Electric Railway Commission, which by appointment of President Wilson had thoroughly investigated the changed economic status of the electric railway industry growing out of the war-time conditions. The outstanding recommendations of the commission were that the companies deal frankly with the public, that they improve their service and that the public on its part see that the companies were accorded a return on their investment that was fair. In his own company Mr. Storrs was successful in giving expression to these recommendations, and it is to this end that he has worked unremittingly and to good effect since he has been managing director of the association.

No Precedent for Work He Did With Association

Precedent, even if he had needed it, was lacking in the office to which Mr. Storrs was appointed with the association. No man knew better than he that no one man could attempt to solve the manifold problems the transportation industry faced when he took hold as managing director, but he did feel that all the men in the industry working together could solve them. And it is to that end he has devoted himself. Qualified as is Mr. Storrs to deal with almost any railway situation that might arise, the managing director has, on the other hand, been conscious of his own limitations. And the success that has attended his work with the association, never spectacularly acclaimed, can be attributed to habits of mind of the man that are ineradicably a part of him. As a matter of fact, it bothered him not a little that upon coming into office some of the daily papers were disposed to refer to him as a czar. Any such attitude is foreign to the man. In fact, his work illustrates strikingly that the sine qua non of accomplishment is not necessarily a dominant demeanor.

Kindly, courteous, ready to listen to the other man's point of view, and withal having a keen insight into human nature, Mr. Storrs has been a big brother to the men in the industry and many a success scored on individual properties, if public acknowledgement were proclaimed, could be traced to the quiet man at association headquarters who, no matter how busy he might be, never was too busy to offer counsel and advice. These are among the characteristics which led in the first place to the selection of Mr. Storrs for the post of managing director and have now led to the offer made to him at Baltimore.

At various times he has been president of the Connecticut Company, operating practically all the electric railways in the state of Connecticut, and many of the bus lines there; president of the New England Investment & Security Company, operating among other properties the railways in Springfield and in Worcester, Mass.; vice-president of the Berkshire Street Railway; a director of the Union Trust Company, Springfield; a director of the New Haven Morris Plan Company, and a director of Grace Hospital in New Haven. In 1916 he was president of the American Electric Railway Association. With the entrance of the United States into the war he devoted himself to directing the association's war activities, and personally served as chairman of the association's committee on national defense in charge of transportation and the co-operation of the electric railways through the national council of defense.

Mr. Storrs was born in Buffalo, N. Y., on Jan. 4, 1869. He was educated at the University of Nebraska, graduating in 1890 and taking a master's degree in 1904. After he left college Mr. Storrs held various technical positions with the Union Pacific Railway, the New York, New Haven & Hartford Railroad and the Colorado Fuel & Iron Company. In 1907 he became president of the New England Investment & Security Company, serving until 1911. From 1912 to 1914 he was vice-president of the New York, New Haven & Hartford Railroad in charge of the electric railway properties operated under the name of the Connecticut Company. When these lines were segregated from the New York, New Haven & Hartford Railroad in 1914 Mr. Storrs was made president of the new system, The Connecticut Company, the post he held at the time of his appointment as managing director of the association.

Construction and Equipment Orders Under Way

New line planned in Baltimore. Long Island improvements include 40 new cars. Chicago car order authorized. Twenty-five-mile railway for Texas. Virginia Electric & Power announces program

PLANS for the extension of its lines in East Baltimore are being made by the United Railways & Electric Company of Baltimore, Md. This new extension will be constructed to serve the new plant to be erected by the Western Electric Company. Officials of the United Railways discussed the subject on Jan. 3 with the Western Electric Company and the municipal authorities, at which time the extension of streets to the plant was also planned. Rights-of-way for tracks were exchanged between the United Railways & Electric Company and the Western Electric Company. The new plant will cost between $25,000,000 and $30,000,000 and will eventually employ about 25,000 persons.

100 Cars for Chicago

The Chicago Surface Lines, Chicago, Ill., is contemplating the purchase of 100 cars. Authorization for 60 of these cars already has been given by the Chicago Railways, and it is anticipated that the Chicago City Railway within a short time will authorize the purchase of the remaining 40. Specifications are now being prepared and should be ready for release in the near future. The Springfield Street Railway, Springfield, Mass., has allotted in its 1929 budget $305,000 for new plant and equipment and $515,000 for maintenance, material and labor. Similarly, the Worcester Consolidated Railway, Worcester, Mass., has allowed $230,000 for new plant and equipment and $620,000 for maintenance, materials and labor, to be expended during this year.

40 Cars for Long Island

The Long Island Railroad, New York, N. Y., will purchase forty new steel cars at a cost of $1,320,000 to bring up the maximum length to eleven cars on all of its trains. It will lengthen the westbound platform of the Kew Gardens station to accomodate eleven-car trains and will stop two additional trains at that station, one in the morning and one in the evening.

These changes in service were voluntarily promised recently by J. F. Keany, counsel for the road, at the first hearing held since the State Transit Commission had ordered certain improvements on the line.

Concerning the fourth and principal feature of the commission's order, equipment of trains in the electric service, with interlocking devices to prevent train movement until all doors are closed, the railway requested more time for consideration.

In the meantime, at the request of the railroad's attorney, engineers of the line and of the commission will confer as to the best method of installing the required devices.

It is said that eight months would be required to equip the trains with the safety devices.

New Texas Railway

The Port Isabel Company, which recently purchased the Rio Grande Railroad that runs from Point Isabel to Brownsville, a distance of 22 miles, also plans to construct an electric railway between Point Isabel and San Benito, a distance of 25 miles. Agricultural developments in the territory along the route of the proposed electric line are making rapid progress, and plans are on foot to make Point Isabel a tourist and pleasure resort.

The Kansas City Public Service Company, Kansas City, Mo., has received one of the new Twin Coach automotive type street cars for experimental purposes. As soon as the car is ready for service it will be tested and placed in regular operation.

The first two units of an order for ten steel passenger cars have been delivered to the Chicago, South Shore & South Bend Railroad, Michigan City, Ind., and will be placed in service immediately. The other units, all motor cars, will be delivered during the next two or three weeks.

All of these cars are the latest design Pullman type, with bucket seats similar to those now in use in a large number of the South Shore Line cars. These cars were built by the Standard Steel Car Company, of Hammond, Ind. This company now has an order for ten more steel cars, five motor and five trailer which are to be delivered in the spring.

Expansion in Virginia

The Virginia Electric Power Company, Richmond, Va., will spend approximately $4,000,000 in expansions to its system and in additions and replacements to its properties in 1929. This is in addition to the plans which are also being perfected for construction in the early part of 1930 on the Roanoke River hydro-electric development which will cost between $7,000,000 and $8,000,000. The 1929 program does not include any outstanding single projects, but will provide for the purchase of new street cars, buses, power apparatus and other equipment to care for the constantly increasing requirements for service. This $4,000,000 expansion and addition program is entirely aside from any maintenance expenses.

The Memphis Street Railway plans approximately $130,000 of track improvements in 1929. At the present time work of relaying the Poplar Avenue track has been started, the old track being replaced with 9-in., 134-lb. rails. This work will be under way for months as far as Dulop Street. Later new trackage on the Hernando line from the Beale to Calhoun Street approach to the depot is in prospect.

During 1928 much work on the railway's tracks was completed. The Jackson Avenue line was extended and new trackage and improvements made on McLemore Avenue, one line in the north

News for Manufacturers

A.E.R.A. Exhibit Committee

Will Hold Its First Meeting on

February 5

to prepare for the Great Exhibition

PLAN NOW TO PARTICIPATE

48th Annual A.E.R.A. Convention

New Atlantic City Auditorium
September 28—October 4, Inclusive

and the other in the south of the city. The Thomas Street line to Chelsea and the city limits north was also rebuilt. The cars were also greatly modernized, a number being equipped with upholstered seats.

The Pacific Electric Railway, Los Angeles, Cal., has ordered one six-cylinder parlor car and one special parlor car, both of nineteen-passenger capacity, from the Fageol Motor Company, Oakland, Cal. The Washington Railway & Electric Company, Washington, D. C., has ordered six, type W. 21-passenger coaches from the General Motors Truck Company. The Virginia Electric & Power Company, Richmond, Va., has purchased five Twin Coaches complete for its Richmond division.

Track Plans for Buffalo

A tentative track reconstruction and track area repaving program to be carried out by the International Railway, Buffalo N. Y., during the year 1929 was discussed recently at a conference between the city and street railway company officials. The proposed program involving fourteen streets was laid before the International Railway for change and ratification. The approved program, which is expected to be modified because of the cost, will be returned to the Common Council within the next 30 days. No estimate was made of the cost of the reconstruction and repaving program. In addition to the program mapped out by the city for the International Railway for the coming year, it was agreed that immediate steps be taken to guarantee the widening of Delaware Avenue to the same width as the avenue from Upper Terrace to Allen Street. The International Railway, following the conference, agreed to remove rails from the streets on which car lines have been abandoned whenever the city requests.

The British Columbia Electric Railway, Vancouver, B. C., will call for tenders immediately for the projected new hydro-electric plant on Stave River at Ruskin, B. C., it was announced recently by W. G. Murrin, president of the company.

The project will call for an ultimate outlay of $7,250,000, and completion of the first unit, which will develop 43,000 horsepower in one generator, is planned for the fall of 1930, in time for the peak load of 1930-31. At the same time, foundations will be laid for another generator of the same size which can be put in at any time. The Ruskin plant may eventually develop 175,000 horsepower.

Track materials purchased recently include 2,000 hemlock ties ordered by the Ottawa Electric Railway, Ottawa, Ont. The Chicago Surface Lines, Chicago, Ill., placed orders for 400 No. 32 14-in. bass African fibre metal case switch brooms. One hundred tons of conductor bar and a tongue switch for 14th and E Streets, N.W., have been ordered by the Washington Railway & Electric Company. Three track switches, 1,000 lb. of welding wire, and 25 kegs of track bolts were ordered recently by the Virginia Electric & Power Company.

Line Materials Ordered

Line material ordered by the Chicago Surface Lines includes 50,000 ft. of $\frac{7}{16}$-in., seven-strand span wire, 20,000 ft. of $\frac{7}{16}$-in., seven-strand bridge wire, 10,000 pieces of No. 000 copper armor, 3,000 trolley armors, 12,000 No. 000 trolley ears and 5,000 ft. of 3½-in. x 18-in. square, bore split, wulfing tile, 35 right hand and 10 left hand 1,000-amp. quick brake, single blade sectionalizing switches, 50 No. 000 right hand and 50 No. 000 left hand switches with 6-in. approaches, 500 galvanized cross-overs with 6-in. bronze removable tips, and 1,300 switches with 6-in. approaches. The Virginia Electric and Power Company ordered 100 clamps and trolley insulators, and 500 trolley ears.

Car equipment and supplies ordered by the Washington Railway & Electric Company include 150 22-in. cast iron car wheels and 50 30-in. cast iron car wheels, 40 30-in. steel wheels, 40 31-in. steel wheels, and 40 33-in. steel wheels. This company also ordered one Bean car washer and four sets of Westinghouse vacuum brakes for type Z coaches. The Chicago Surface Lines ordered one Wardwell model G double-acting band saw filer and setter. St. Louis Public Service Company, St. Louis, Mo., has filed plans for a two-story addition to its equipment and mechanical shop, to cost about $40,000.

Westinghouse Sales High

Operations of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., in the year just ended were at record levels, the quarter ended Sept. 30, last, establishing a new peak on earnings of $6,373,120, after all charges, or equal to $2.68 a share on 2,370,063 shares of combined preferred and common stocks issued. Previously Westinghouse's fiscal year ended March 31, but several months ago it was decided to alter this to the calendar year. The 1928 statement, therefore, will cover only nine months' operations.

The company estimates net income for the nine months last year to Dec. 31, before deduction of bond interest, but after federal taxes, at $18,000,000, which would be the equivalent of $6.75 a share on the enlarged capital basis of 2,666,315 combined shares. Computing on the same basis—that is, eliminating bond interest—this is an increase of about 5 per cent over the full year ended March 31, last, when net income, after taxes, totaled $17,141,163, or $6.43 a share on the larger capital.

Compared with the nine months to Dec. 31, 1927, on the new basis, when net income totaled $12,806,000, after taxes, or $4.80 a share, the results for the nine months ended Dec. 31 represent an increase of 40 per cent. The brevity of Westinghouse's quarterly reports precludes a proper interpretation of the great increase in net income this year.

Paving Brick Association to Meet

The 23d annual meeting of the National Paving Brick Manufacturers Association will be held at the Mayflower Hotel, Washington, D. C., Feb. 13-14-15, 1929. The program for the first two days will include papers and discussions of the latest practices in the design and construction of streets and highways, particlarly the vitrified brick type. These sessions will be open to the general public and anyone interested in street and highway development is urged to attend. Many prominent engineers and other highway authorities will take part in the meeting. There will be a banquet Thursday night, Feb. 14, and the regular annual business session will be held on the last day of the meeting. Fred L. Manning of the Peebles Brick Company, Portsmouth, Ohio, is president of the association and George F. Schlesinger, chief engineer and managing director.

Weekly Business Conditions

The volume of business during the week ended Jan. 12, 1929, as reflected by check payments, was greater than in the corresponding period of 1928, according to the weekly statement of the Department of Commerce. Activity in steel plants was likewise greater than in the same week of last year. Detroit factory employment, indicating operations in the automobile industry, showed substantial expansion as compared with both the preceding week and the same week of 1928. The output of crude petroleum, covering the latest reported week, showed gains over both the preceding week and the same period of last year. Bituminous-coal output was also larger than in either prior period. Copper prices averaged higher than in either period, while iron and steel

Weekly Business Indicators

(Weeks ended Saturday. Average 1923-25 = 100)

	1929		1928			1927		
	Jan. 12	Jan. 5	Dec. 29	Dec. 22	Jan. 14	Jan. 7	Dec. 31	Dec. 24
Steel operations	110.5	110.5	107.9	105.3	93.0	88.0	75.0	r88.0
Bituminous-coal production	.....	101.3	70.7	113.4	111.5	101.1	81.5	100.7
Lumber production	.....	74.5	45.0	85.0	97.3	72.7	57.3	88.2
Petroleum production (daily average)	.....	124.4	123.9	122.5	113.9	114.2	116.2	116.8
Building contracts 37 states (daily av.)	.....	64.4	116.7	105.5	109.2	56.2	104.4	121.1
Price iron and steel, composite	87.5	87.6	87.5	87.5	85.1	84.7	84.7	84.8
Copper, electrolytic, price	...	119.6	117.4	114.5	100.0	100.7	100.0	100.0
Check payments	154.8	164.2	119.3	150.6	138.0	154.9	103.4	132.8
Interest rates, call money	154.5	200.0	251.5	178.8	100.0	115.1	133.3	103.0
Business failures	156.0	116.2	88.2	120.6	154.3	125.1	103.9	122.4
Interest rates, time money	174.3	182.9	191.4	188.6	97.1	97.1	97.1	97.1
Federal reserve ratio	85.5	79.9	79.5	83.2	91.2	86.7	86.2	86.7

prices, showing a fractional decline from the preceding week, were higher than a year ago.

Loans and discounts of Federal Reserve member banks showed a material contraction from the preceding week but were larger than a year ago. Interest rates on both time and call funds averaged lower than in the previous week but were substantially higher than a year ago. Prices for stocks showed only slight change from the preceding week but were higher than last year. Bond prices were also unchanged from the preceding week, but were below the level of a year ago.

Largest Electric Railway Export to Canada

Of the total railway motors, electric railway locomotives, electric mining and industrial locomotives, starting and controlling equipment for electric railways and vehicle motors, and railway signals, switches and accessories, valued at $118,755, which were exported from this country during the month of October, Canada received by far the greatest amount. The total export to the Dominion of these products was $80,317 which is divided in the following classes: Railway motors, $1,470, railway electric locomotives, $9,699, mining and industrial electric locomotives, $7,105, starting and controlling equipment, $2,037, and railway signals, switches and attachments, $60,006.

Peru was second on the list, receiving $7,807, a large part of which was industrial and mining electric locomotives. British India was a close third receiving $7,065 worth of equipment, nearly all of which was railway motors. The total exports to Colombia were $7,010, most of which were railway motors. The total exports from this country were divided in the following classes: Railway motors, $17,455, railway electric locomotives, $11,622, mining and industrial electric locomotives, $17,149, starting and controlling equipment, $7,482, and railway signals, switches and attachments, $65,047.

Cincinnati Car Corporation Elects Officers

New officers of the Cincinnati Car Corporation, which now includes the Cincinnati Car Company and the Versare Corporation, Albany, N. Y., are H. L. Sanders, president; A. L. Kasemeier, J. H. Elliott and A. F. Warhaus, vice-presidents; E. C. Bernhold, secretary-treasurer and S. E. Reiph, assistant secretary-treasurer.

The board, elected Jan. 8, by the stockholders, includes: Louis J. Hauck, Frederick Hertenstein, Harry M. Levy, Stanley M. Rowe, T. H. Schoepf, Joseph B. Verkamp, H. Belin Voorhees, Gustav A. Weil, William F. Wiley, Harry A. Worcester, Frederick Pruyn, G. S. Rockefeller, F. S. Moseley, and Messrs. Sanders and Warhaus.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 15, 1929

Metals—New York

Copper, electrolytic, cents per lb.	16.525
Lead, cents per lb.	6.65
Nickel, cents per lb., ingot	35.
Zinc, cents per lb	6.7
Tin, Straits, cents per lb.	49.
Aluminum, 98 to 99 per cent, cents per lb.	23.90
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	53.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.45
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago	1.50
Central, Ill., screenings, Chicago	1.075
Kansas screenings, Kansas City	1.70

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb.	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.6
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	18.
Waste, cotton (100 lb. bale), cents per lb.:	
White	17.25
Colored	13.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	10.4
White lead in oil (100 lb. keg), cents per lb.	13 2
Turpentine (bbl. lots), per gal.	$0.665
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	18.62
Rubber-covered wire, No. 14, per 1,000 ft.	5.75
Weatherproof wire base, cents per lb.	19.255

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	$1.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.375
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¼-in., cu.yd., delivered	3.375
Sand, cu.yd., delivered	2.125

Old Metals—New York and Chicago

Heavy copper, cents per lb.	13.375
Light copper, cents per lb.	11.625
Heavy yellow brass, cents per lb.	7.875
Zinc, old scrap, cents per lb.	3.375
Lead, cents per lb. (heavy)	5.125
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	17.50
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	8.25

Japanese Electrification Plans

Electrification of nine sections of five trunk railway lines has been decided upon by the Japanese Ministry of Railways. The projects will be spread over a period of six years, and will cost approximately 40,000,000 yen. All sections of the railway throughout the country which have numerous tunnels or heavy grades will be electrified. This plan is the result of a considerable number of studies which have been made and is based upon the original purpose to electrify all trunk lines situated near large cities.

Included in the plans is the construction of a new electric line connecting the present Ochanomizu station of the Yamanote line, which is the inner loop of the line encircling Tokyo with the Ryogoku railway station, and of laying parallel tracks between Ryogoku and Kameido, together with their electrification. This construction will cost more than 4,000,000 yen. This is to be an elevated railway and will cover a distance of 2,400 m. Three new bridges will be constructed, one of which will be 169 m. in length.

TRADE NOTES

SULLIVAN MACHINERY COMPANY, Chicago, Ill., has elected Arthur E. Blackwood president of the company, succeeding the late Frederick K. Copeland. Mr. Blackwood has been with the Sullivan Machinery Company for the past 32 years. He came to the company shortly after graduating at Toronto University as a mechanical and electrical engineer, and later became manager of its eastern sales department with headquarters in New York, which office he held for 23 years. He was then elected a director and first vice-president in charge of finances, and moved to the company's head office at Chicago, where he continued in close relation with Mr. Copeland until the latter's death in November of this year.

KING COMPANY, manufacturer of cast iron street lighting products with manufacturing plant and general offices located at Sheffield, Ala., and sales office at Chicago, Ill., has reorganized whereby general and sales offices will be located at Canton, Ohio, with manufacturing plant at Sheffield, Ala., as at present. The Union Metal Manufacturing Company, of Canton, Ohio, has entered into an agreement with the King Company to sell all of its products, and the General Electric Merchandise Distributors' Association and Graybar Electric Company will act as agencies for the Union Metal Manufacturing Company in selling both steel and iron lighting standards.

SHEPARD ELECTRIC CRANE & HOIST COMPANY, including its Sprague Division, and the Niles Crane Corporation have combined under the corporate title of Shepard-Niles Crane & Hoist Corporation. The new corporation is in a position to provide a line of standard and special traveling cranes and electric hoists. The Shepard plant at Montour Falls, N. Y., and the Niles plant at Philadelphia, Pa., will be continued in operation for the production of the types of equipment for which their facilities have been designed. The main office will be at Montour Falls, N. Y.

Give your motorman an "even break"



DON'T blame the motor man because the brakes refused to hold. Perhaps he never had a chance due to inadequate equipment. Maybe the hand brake clogged with chain—maybe it didn't take up all the slack—maybe it was too slow in functioning. In any event he didn't get an "even break"—and lost.

PEACOCK STAFFLESS BRAKES



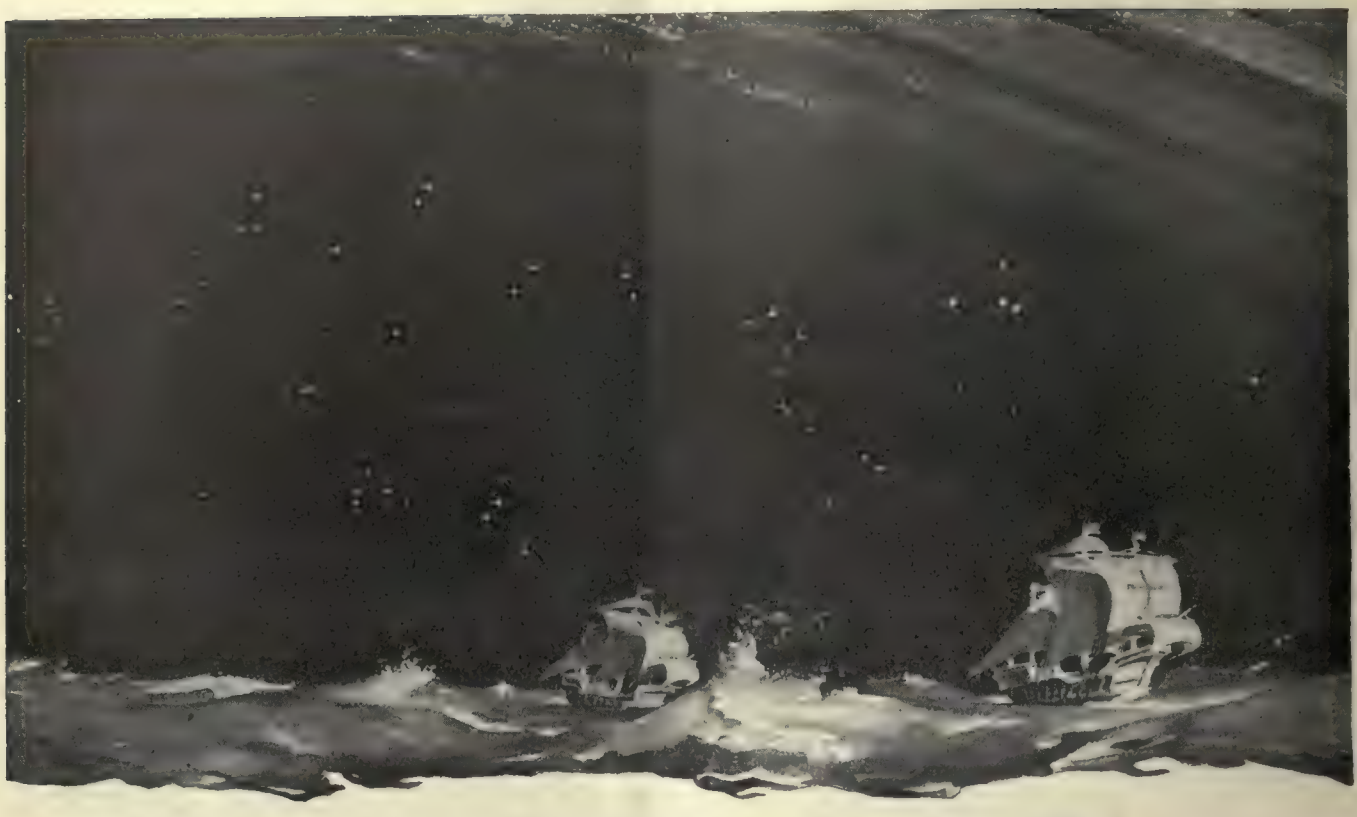
eliminate all the possibilities by the very nature of their design. Fast on the take up, lots of power, never clog with chain, no matter how slack the rigging may be. Not to mention the fact that they are sturdy, rugged, light in weight, saving in valuable platform space, and good for the life of the car.



NATIONAL BRAKE CO., Inc.

890 Ellicott Avenue, Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.
The Ellcon Company—General Sales Representatives, 50 Church St., New York



What Sleepless Nights Columbus



COLUMBUS was scared. Who wouldn't be? With all his convictions, there must have been a lurking fear that after all the Earth might be flat, just as everybody thought. In the middle of any dark night the Santa Maria might go careening over the edge into oblivion. Every lurch of the vessel helped to keep the ugly thought alive.

After all, Columbus was challenging the belief of centuries. No one had sailed into the Western Sea before. There were no charts . . . how could he know? How could he sleep at night?

❖ ❖ ❖

American business today is navigating strange seas. Speed, style, consolidations, high wages and high buying power, chain distribution, electrical development, synthetics, and all the other manifestations of changed conditions have completely revolutionized the business outlook.

We hold the highest faith in the future of American business. It has met the problems of an expanding civilization with courage and resourceful intelligence.

But the very success of American business has presented its leaders with new problems. Today they are pioneers on a scale never before approximated; and yesterday's trusted business barometers no longer clearly point the way.

The very greatness of business today underscores the need for a new navigating instrument, *one that will help interpret the effect of today's events and today's changes on tomorrow's operating statements.*

❖ ❖ ❖

That is the expanded purpose of *The Magazine of Business*—to be a magazine of interpretation; to search for the significance and the consequences of

McGRAW-HILL

Mc GRAW-HILL PUBLISHING COMPANY, Inc., New York



Must Have Had

events; to help you foresee their influence on your business; to help you prepare for them and make them work to your advantage.

The Magazine of Business also covers today's business conditions and treats of ideas tested in one type of business that are applicable to another—but always in the spirit of interpretation.

In achieving the purpose of *The Magazine of Business,* its editors are enriched by the entire resources of the McGraw-Hill organization, whose contacts, records, sources of information and 128 specialist editors penetrate those basic industrial and business fields where many of the new developments originate.

McGraw-Hill engineering, industrial and business papers are all allied with *The Magazine of Business* to catch events at their origin and to show where they may be leading.

Whatever your business, it is subject to the influence of events taking place outside as well as within—in the electrical, chemical, mining, construction, machinery, transportation, textile and other fields. You cannot directly watch every development and take the time to project its significance to your business. But *The Magazine of Business* does it for you.

Marketing counsel, research, news gathering facilities—in a word, the *resources* of McGraw-Hill—are applied to enable *The Magazine of Business* to fulfill its purpose as a magazine pointing the way ahead for the business executives of America.

THE MAGAZINE OF BUSINESS

is one of 24 McGraw-Hill publications, all actuated by the same spirit of interpretative purpose. 600,000 industrialists, engineers and business men subscribe regularly to these publications. More than 3,000,000 use McGraw-Hill books and magazines in their business.

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Build Track That Defies Time By The Dayton Integral System



Build Track That Defies Time By the Dayton Integral System

Paved track which as a whole breaks down within a few years is at variance with the well-known durability of its component parts.

The reason for this early failure is no longer a puzzle. Vibration of traffic causes a destructive interaction between track and paving which destroys both.

The Dayton Integral System of Track and Paving Structure, provides in the Dayton Tie, a vibration absorbing element which prohibits the destructive action.

The Dayton Tie also provides re-enforcing for the concrete slab, which, so re-enforced and protected, carries both rail and paving load with its entire thickness.

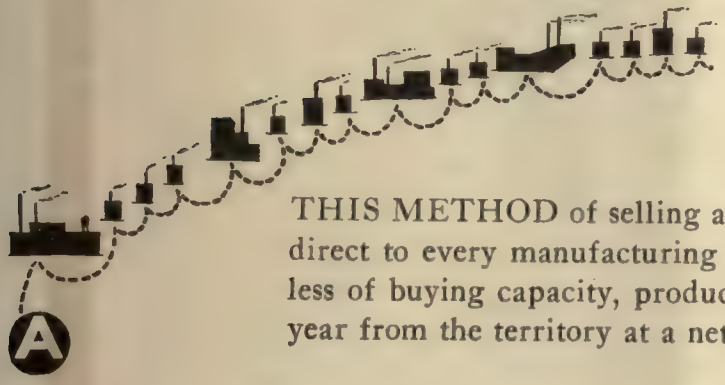
The result is a unified track and paving structure—strong—defiant of time—approaching permanence—requiring no major repairs.



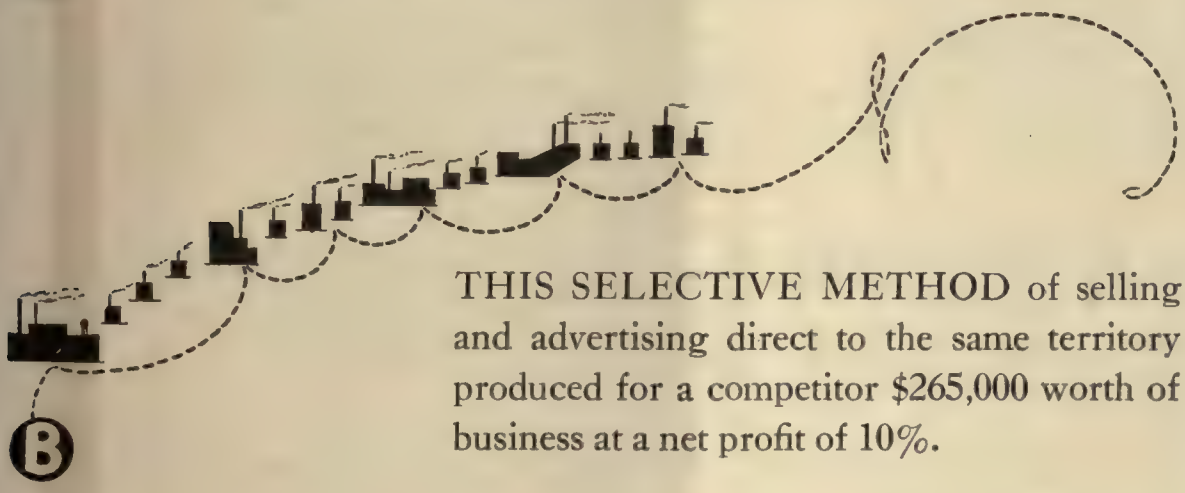
THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO

This is one of a series of McGraw-Hill advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

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THIS METHOD of selling and advertising direct to every manufacturing plant, regardless of buying capacity, produced $250,000 a year from the territory at a net profit of 2%.



THIS SELECTIVE METHOD of selling and advertising direct to the same territory produced for a competitor $265,000 worth of business at a net profit of 10%.

Practical Industrial Advertising Coverage, like practical sales coverage, is a problem of selecting the plants with buying capacity and directing sales and advertising effort thereon.

You are invited to make at any time a personal inspection of McGraw-Hill circulation methods which produce the Practical Industrial Advertising Coverage illustrated in "B."

—The publishers

F-1

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The J. G. White Engineering Corporation
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Engineers and Constructors — 20 Pine Street, New York
Transportation Examinations and Reports

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THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

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INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

POSITION VACANT

STOCK clerk, with some experience in railway storehouse, who can operate typewriter and do general office work in storehouse of sugar mill located in Porto Rico. Single man preferred. Salary $125.00 per month and board to the right man. Transportation paid from New York. Reply to Aguirre Corp. of N. Y., 129 Front St., New York City.

POSITIONS WANTED

POSITION wanted as master mechanic. The best of references, long experience. PW-157, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, broad experience, clean successful record covering every phase of transportation, seeks connection with future. Best of references. PW-156, Electric Railway Journal, 1600 Arch St., Phila., Pa.

Snow Fighting Equipment

1—Double Truck Rotary Plow.
2—Double Truck Nose Plows.
1—Double Truck Shear Plow.
3—Single Truck Sweepers.

Excellent Condition **Immediate Delivery**

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A MARKET FOR YOUR

Rotary Converters

"We are interested in purchasing a number of 500 kw., 60 cycle rotary converters, or larger, those with 33,000 volt transformers preferred. Give full name plate data, general condition and prices both with and without transformers in first letter. Will consider 300 kw. machines if no larger are available."

W-155, Electric Railway Journal.
7 So. Dearborn St., Chicago, Ill

FOR EVERY BUSINESS WANT

"Think **Searchlight** *First"*

Double Truck Snow Plow

Fully Equipped
Priced to Move Quickly
Also Johnson Type D Fare Boxes

Write or Wire

J. W. GERKE

303 Fifth Ave., New York City, N. Y.

Saving is a good habit, BUT— Why Save Things You'll Never Use?

WHY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

TODAY you can turn them over at a fair price. Tomorrow they will be—JUNK. Is it not the better part of good horse-sense to dispose of them NOW?

6000 other electric railway men will see your advertisements of used or surplus equipment and materials here—in the Searchlight Section of their business paper.

Some of these men—officials or executives of other lines in other parts of the country and operating under different conditions—can use what you no longer need. For an insignificant investment you can tell these others what you have. And they will buy.

One "Searchlight" advertiser wrote, "We can cheerfully recommend the Searchlight Section as a wonderful medium for reaching buyers of rails and equipment." Another—"The strongest proof that your 'Searchlight' finds its way to many readers is shown by the numerous letters we have received in answer to our recent ad."

Let us tell you the cost of advertising your used or surplus equipment and materials in the Searchlight Section. Just address a list of what you have to dispose of to the

Searchlight Department

ELECTRIC RAILWAY JOURNAL

Tenth Ave. at 36th St., New York, N. Y.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Air Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Wks.
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Axles, Front
Shuler Axle Co.

Axles, Steel
Bethlehem Steel Co.

Babbit Metal
National Bearing Metals Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Wks.
Nat'l Bearing Metals Corp.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Stucki Co., A.

Bells & Buzzers
Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Brill Co., The J. G.

Body Material, Haskelite & Plymetl
Haskelite Mfg. Co.

Bolts, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Bond Testers
Elec. Service Supplies Co.

Bonding Apparatus
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Books
McGraw-Hill Pub. Co. Inc.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Columbia Machine Wks.
Electric Rlwy. Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Nat'l Rlwy. Appliance Co.
Westinghouse Tr. Brake Co.

Brake Shoes
Bemis Car Truck Co.
Brill Co., The J. G.

Brake Testers
Nat'l. Rlwy. Appliance Co.

Brakes, Brake Systems and Brake Parts
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Westinghouse Tr. Brake Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon
General Electric Co.
Westinghouse E. & M. Co.

Brushholders
Columbia Machine Wks.
General Electric Co.

Bulkheads
Haskelite Mfg. Co.

Bus Lighting
Nat'l Railway Appliance Co.

Buses, Gas, Electric
General Electric Co.

Bushings, Case Hardened and Manganese
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnished
General Electric Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & Mfg.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

Castings, Brass Composition or Copper
Cincinnati Car Co.
Columbia Machine Wks.
Nat'l. Bearing Metals Corp.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works & Standard Steel Works Co.
Wm. Wharton, Jr. & Co.

Castings, Malleable & Brass
Bemis Car Truck Co.
Columbia Machine Wks.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.

Ceiling, Car
Haskelite Mfg. Co.

Ceilings, Plywood Panels
Haskelite Mfg. Co.

Chairs, Parlor Car
Heywood-Wakefield Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co

Change Trays
Cincinnati Car Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Wks.
Electric Rlwy. Equip. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Brill Co., The J. G.
Cincinnati Car Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Changers
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutators, Parts
General Electric Co.

Commutator Slotters
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Westinghouse Tr. Brake Co.

Condensers
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Wks.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
American Brass Co.
Anaconda Copper Mining Co.

Copper Wire Instruments Measuring, Testing and Recording
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., J. A.

Cord Connectors and Couplers
Elec. Service Supplies Co.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols Lintern Co.

Cranes, Hoist and Lift
Electric Service Sup. Co.

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Crossing Foundations
International Steel Tie Co.

Crossing, Frog and Switch
Ramapo Ajax Corp.
Wm. Wharton,Jr.& Co., Inc.

Crossing Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton,Jr.& Co., Inc.

Crossings
Wm. Wharton Jr. & Co.,
Ramapo Ajax Corp.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Track Work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Dealer's Machinery & Second Hand Equipment
Gerke, G. W.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

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Columbia Machine Wks.
Electric Service Supplies Co.

Detective Service
Wish-Service, P. Edward

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Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.,

Doors and Door Fixtures
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Doors, Folding Vestibule
National Pneumatic Co.

Drills, Track
Elec. Service Supplies Co.
Ohio Brass Co.

Drum Truing Lathes
Nat'l Railway Appliance Co.

Dryers, Sand
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Wks.
Electric Service Supplies
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electrical Wires and Cables
Roebling's Sons Co., John

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Beeler, John A.
Buchanan & Layng Corp.
Byllesby Co., H. M.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

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Haskelite Mfg. Co.

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Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Railway Appliance Co.
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Electric Service Sup. Co.
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Brill Co., The J. G.
Cincinnati Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Floodlights
Elec. Service Supplies Co.
General Electric Co.

Floor, Sub
Haskelite Mfg. Co.

Floors
Haskelite Mfg. Co.

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American Steel Foundries
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Columbia Machine Works
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
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Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co
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Continued on page 30

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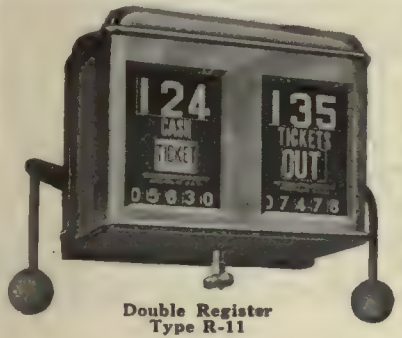
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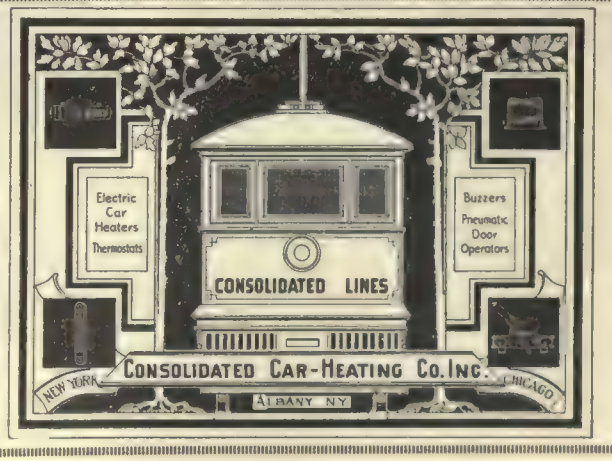
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Amer. Insulating Mach. Co.

Manganese Steel Castings
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Lorain Steel Co.
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Manganese Steel Guard Rails
Ramapo Ajax Corp.
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Cincinnati Car Co.
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Hale-Kilburn Co.
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Nuts and Bolts
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Carey Co., Philip

Rail Grinders (See Grinders)

Rail Joints
Rail Joint Co., The

Rail Joints—Welded
Lorain Steel Co.

Rails, Steel
Bethlehem Steel Co.

Rail Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

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Consolidated Car Heating Co
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
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Brill Co., The J. G.
Cincinnati Car Co.
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Westinghouse E. & M. Co.

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Consolidated Car Heating C
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Rheostats
General Electric Co.
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Hyatt Roller Bearing Co.

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Haskelite Mfg. Co.

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Haskelite Mfg. Co.

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Brill Co., The J. G.
Electric Service Sup. Co.
Nichols-Lintern Co.
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Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.

Sash, Metal, Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seating Materials
Brill Co., The J. G.
Hale-Kilburn Co.
Haskelite Mfg. Co.
Heywood-Wakefield Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
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Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
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Gerke, G. W.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

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Brill Co., The J. G.

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Side Bearings (See Bearing Center and Side)

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Electric Service Sup. Co.
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Slack Adjusters (See Brake Adjusters)

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Cincinnati Car Co.
Electric Railway Equip. Co.
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Brill Co., The J. G.

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American Steel Foundries

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Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Westinghouse E. & M. Co.

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Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
Roeblings Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express, etc.)

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

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Ramapo Ajax Corp.

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General Electric Co.

Switches and Switchboards
Consolidated Car Htg. Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Telephones and Parts
Electric Service Sup. Co.

Telephone & Telegraph Wire
Roebling's Sons Co., J. A.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
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Electric Service Sup. Co.

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Dayton Mechanical Tie Co.

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Transfers (See Tickets)

Transformers
General Electric Co
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Cincinnati Car Co.

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Okonite Co.
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Nat'l Bearing Metals Corp.
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Trolley Bases, Retrieving
Ohio Brass Co.
Westinghouse-Nuttall

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Continued on page 32

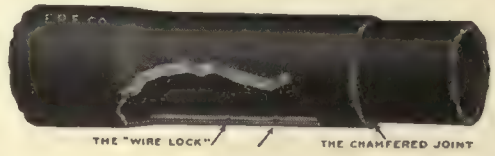
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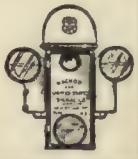
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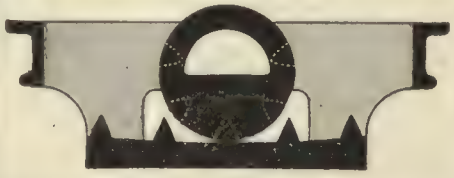
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ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Page

—A—

American Brake Shoe & Foundry Co. 31
American Brass Co., The..... 31
American Car Co.....Third Cover
American Insulating Mach. Co.. 22
Anaconda Copper Mining Co... 31

—B—

Beeler Organization, The..... 26
Bell Lumber & Pole Co..... 22
Bemis Car Truck Co..... 22
Bethlehem Steel Co..... 29
Brill Co., The J. G....Third Cover
Buchanan & Layng Corporation. 26
Byllesby Eng. & Management Co.. 26

—C—

Carey Co., Philip.....Insert 14
Cleveland Fare Box Co., The... 22
Collier, Inc., Barron G..... 8
Columbia Machine Works & M. I. Co. .....Insert 130B
Consolidated Car Heating Co... 29

—D—

Dayton Mechanical Tie, Co., Insert 23, 24
Differential Steel Car Co., The.. 22

—E—

Earll, C. I.....Insert 130A
Electric Railway Equipment Co. 31
Electric Service Supplies Co... 7

Page

—F—

Faile & Co., E. H..... 26
Ford, Bacon & Davis, Inc..... 26
"For Sale" Ads..... 27

—G—

General Electric Co..... 18
Gold Car Heating & Ltg. Co., Insert 12, 13
Goodyear Tire & Rubber Co.... 10

—H—

Hale & Kilburn Co..... 22
Haskelite Mfg. Co.....Back Cover
"Help Wanted" Ads..... 27
Hemingray Glass Co..... 29
Hemphill & Wells 26
Heywood-Wakefield Co....Insert 11
Holst, Englehardt W..... 26

—I—

International Register Co..... 29
International Steel Tie Co., Front Cover

—J—

Jackson, Walter 26
Johnson Fare Box Co..... 22

—K—

Kelker, DeLeuw & Co..... 26
Kuhlman Car Co.....Third Cover

Page

—L—

Lorain Steel Co., The..Insert 130B

—M—

McClellan & Junkersfeld..... 26
McGraw-Hill Pub. Co., Inc., 17, 20, 21

—N—

Nachod and United States Signal Co., Inc. 31
National Bearing Metals Corp. Insert 130A
National Brake Co., Inc..... 19
National Pneumatic Co..... 15
National Railway Appliance Co. 22
Nichols-Lintern Co., The..... 31

—O—

Ohio Brass Co..... 5
Okonite-Callender Cable Co., Inc., The 29
Okonite Co., The..... 29

—P—

Perey Mfg. Co., Inc..... 22
Positions Wanted and Vacant.. 27

—R—

Rail Joint Co., The 31
Railway Track-work Co. 6
Railway Utility Co..... 31
Ramapo-Ajax Co..... 31
Richey, Albert S..... 26
Roebling's Sons Co., John..... 31

Page

—S—

Sanderson & Porter 26
Seachlight Section 27
Shuler Axle Co. .....Insert 130B
Smith Heater Co., Peter..... 31
Standard Steel Works Co..... 9
Star Brass Works..... 31
Stevens & Wood, Inc..... 26
Stone & Webster 26
Stucki Co., A..... 31

—U—

Una Welding & Bonding Co.... 22
Universal Lubricating Co., Insert 130A

—W—

"Want" Ads 27
Wason Mfg. Co.....Third Cover
Westinghouse Electric & Mfg. Co. .....Second Cover
Westinghouse-Nuttall 4
Westinghouse Traction Brake Co. 16
Wharton, Jr. & Co., Wm..... 29
"What and Where to Buy", 28, 30, 32
White Engineering Corp., J. G.. 26
Wish Service, The P. Edw.... 26

SEARCHLIGHT SECTION

Classified Advertising

Classification — Page

BUSINESS OPP. 27
EMJLOYMENT 27
USED AND SURPLUS EQUIPMENT 27
Gerke, G. W..... 27

WHAT AND WHERE TO BUY—Continued from page 30

Trolley Material (Overhead)
Electric Service Sup. Co.
General Electric Co.
Nat'l Bearing Metals Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

Trolley Wheel Bushings
Nat'l Bearing Metals Corp.
Star Brass Works

Trolley Wheels (See Wheels, Trolley)

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American Steel Foundries
Anaconda Copper Min. Co.
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Brill Co., The J. G.
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General Electric Co.
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Nichols-Lintern Co.
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Lorain Steel Co., The
Railway Trackwork Co.
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Welders, Portable Electric
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
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Westinghouse E. & M. Co.

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Ohio Brass Co.
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By utilizing the great strength and light weight of these two materials, the builders were able to keep the weight down to only 17,500 lbs., although the car provides plenty of comfortable space for 40 passengers.

PLYMETL and HASKELITE also aided in the elimination of noise in this modern street railway coach, which was designed for long life and economy of operation. Both HASKELITE and PLYMETL have demonstrated their effectiveness in reducing maintenance costs and operating costs in street railway service.

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PLYMETL

ELECTRIC RAILWAY JOURNAL

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Lengthen the "*Time Element*" in Buses







How long will a bus go on producing profits—keeping down maintenance and keeping out of repair shops?

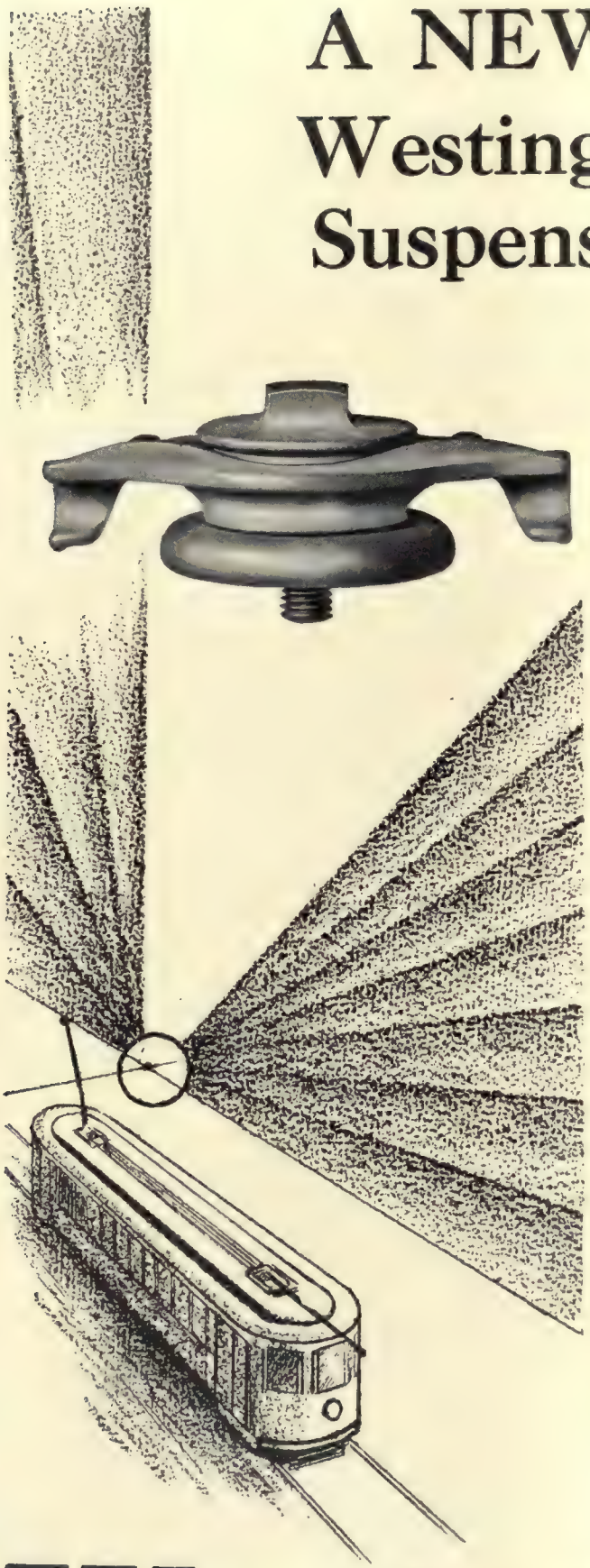
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A NEW Westinghouse Suspension



ALIGNING type, and of simple construction.

Yoke is securely fastened to the body.

Body is free to turn in yoke.

Body is 3½ inches in diameter which gives ample creepage distance.

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1929

Advertising Index—Alphabetical, 44; Classified, 40, 42, 44; Searchlight, 39

Vol. 73, No. 4 *Pages 149 to 188*

January 26, 1929

In This Issue

Editorials 149

A Constructive Move in Seattle—New York's New Traffic Plan Starts Well—There Is No Magic to Modernization—Wanted: Young Blood—Stability of Costs Continues—Not Afraid to Proclaim Its Ideals—Fuel Oil Tests Apparently Successful

Modernization Increases Riding in Lafayette 152

By purchasing energy, introducing one-man cars, rerouting lines, rehabilitating track, giving adequate service and cultivating good will the local railway has increased its riding 50 per cent.

New Group of Standardized Cars Designed 157

BY GEORGE FREY

General construction features of the new line of standardized cars developed by the J. G. Brill Company, including six models for city service and two interurbans, are given in this article.

Tampa Reduces Accidents 58 Per Cent 161

Persistent and successful effort toward greater safety was responsible for the record of the Tampa Electric Company which won the 1927 Anthony N. Brady Award for medium-sized electric railways.

P.R.T. to Use Fuel Oil for Buses 165

BY J. A. QUEENEY

With the vaporizing equipment, described by the author, it is possible to use oil of 38-42 specific gravity, Baumé, effecting a saving in fuel cost over gasoline of approximately 29 per cent.

Buses Solve Unusual Traffic Problem in Cincinnati 155

Double Trolley Catenary Construction 156

Extensive Improvements Made on Rochester Subway 163

Credit Union Formed in Gary 164

Two Hours From South Bend to Chicago 168

Cincinnati Railway Builds Attractive Office 169

New Yorkers Discuss Methods of Bettering Public Relations 170

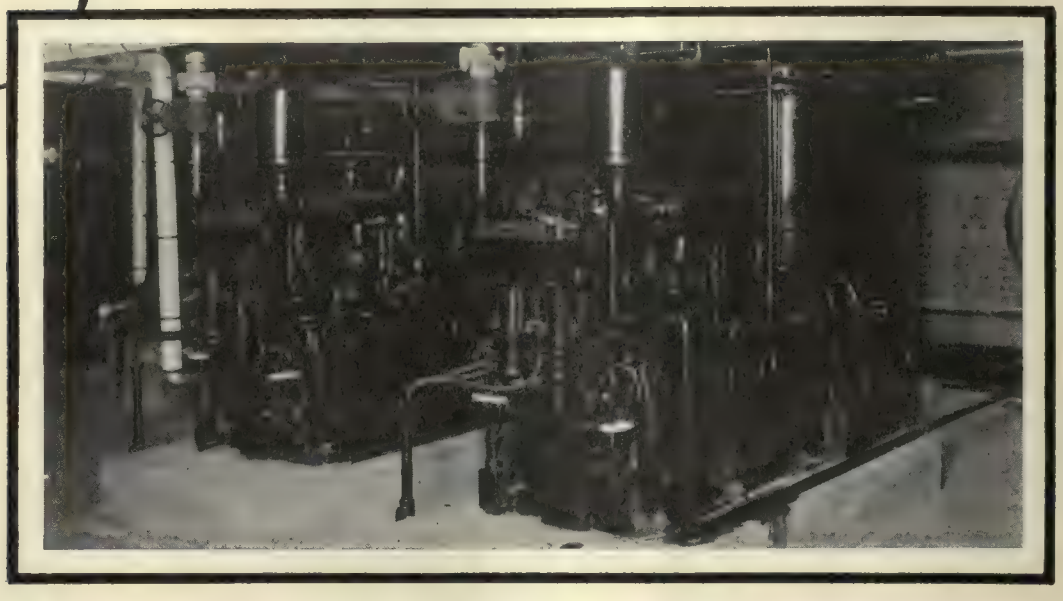
Time and Labor-Saving Ideas from Staten Island 171

Improved Equipment Suggestions 173

News of the Industry 174

New York Becomes Travel and Traffic Wise—Relief Suggested in Grand Rapids—Pennsylvania Railroad Buys Into P.R.T. Long-Distance Bus Lines—Governors Discuss Utility Problems—New Phase of Piedmont and Northern Petition—Membership of Exhibit Committee Announced.

Satisfaction that endures



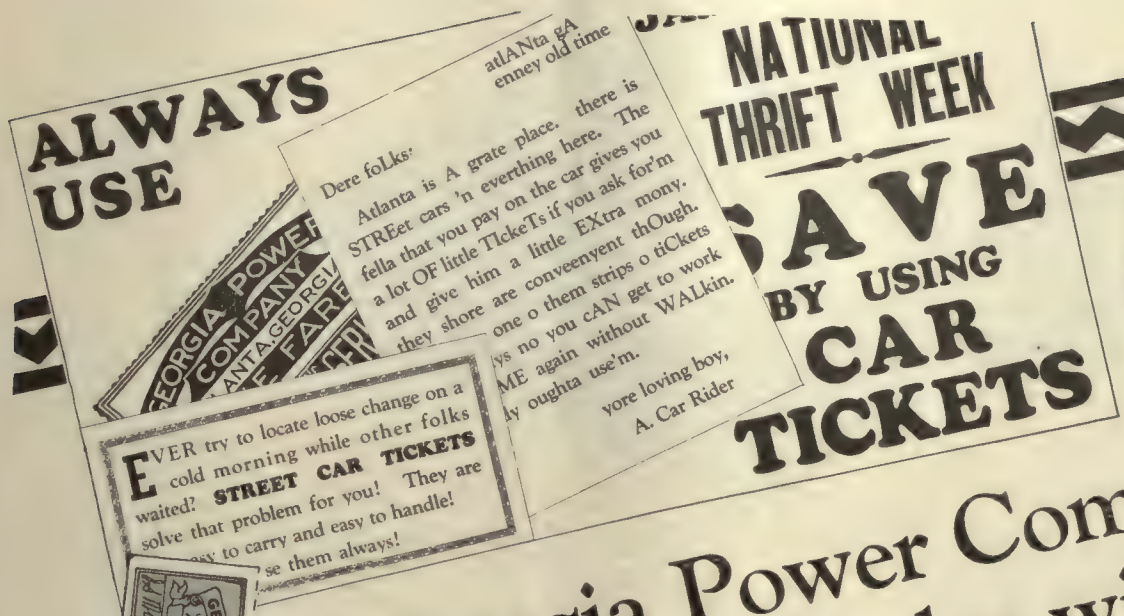
THE quality of Westinghouse National Air Compressors is a warranty of enduring satisfaction.

Quality is the first thought in design, construction and assembly. This strict adherence to high standards has established a reputation for long life, dependability, and economy of operation.

Because of this, many traction properties are now using Westinghouse-National Air Compressors exclusively in their shops, power houses, and maintenance departments. All types and sizes are available, ranging from 3 to 700 cu. ft. displacement—all "Quality Machines for Quality Service."

WESTINGHOUSE—NATIONAL
Air Compressors
"QUALITY MACHINES FOR QUALITY SERVICE"

WESTINGHOUSE TRACTION BRAKE COMPANY
Industrial Division
General Office and Works . . . . . Wilmerding, Pa.



This business-producing appeal appeared in "Two Bells"—the periodical organ published by the Georgia Power Co.

Georgia Power Company steps up sales with novel ticket-selling plan

The Georgia Power Company is another of the many properties that believe in tickets, and in merchandising the ticket idea to the public.

Tickets in the pocket are more readily spent than cash, thereby building up the riding habit. Tickets also speed up fare collection, likewise loading and schedules.

Through the columns of "Two Bells" (the car-rider's weekly); and dash signs, car cards and tie-ups with local stores, the ticket idea is sold, just as a merchant sells his goods.

And Atlanta likes tickets, as shown by the increase in percentages of riders using tickets.

Perhaps your road, too, can build up revenue, get cash in advance, sell a fare increase, shorten schedules and improve your auditing control by tickets—we are constantly designing new ones for special conditions.

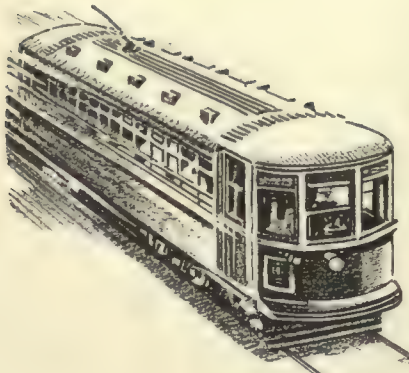
Suggestions for the asking from the nearest of our ten offices.

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Philadelphia
Boston
New York
Los Angeles

Globe TICKET COMPANY
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Sales Offices:
Baltimore
Cincinnati
Cleveland
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Atlanta

Let GLOBE do it





It's "miles per dollar" not "dollars per wheel" that shows the true economy of—

STANDARD STEEL WHEELS

STANDARD STEEL WORKS COMPANY

CHICAGO
NEW YORK
RICHMOND
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PHILADELPHIA, PA.
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SAN FRANCISCO



Made in halves to halve your gear case costs

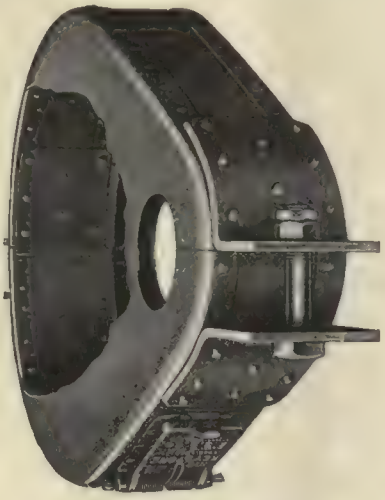
Keystone steel gear cases have largely replaced malleable iron cases for electric railway work because an accident usually causes them to bend rather than crack or break. Therefore, ordinary repairs can be made with a minimum amount of labor.

The most remarkable economical feature of Keystone Steel Gear Cases is this: All gear cases of a given type are formed by the same dies, so that halves of the same type of case are perfectly interchangeable, permitting a replacement of a broken half and frequently avoiding the necessity of scrapping the entire case when only one-half is useless.

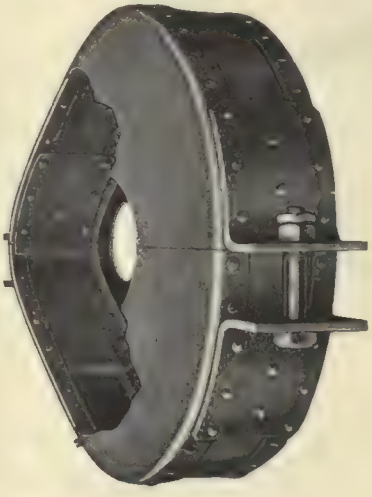
Standardize on Keystone Steel Gear Cases—it's a *sure* way to cut replacement costs in half.



Under View of Bottom Half



Showing External Construction



Showing Internal Construction



Inner View of Top Half

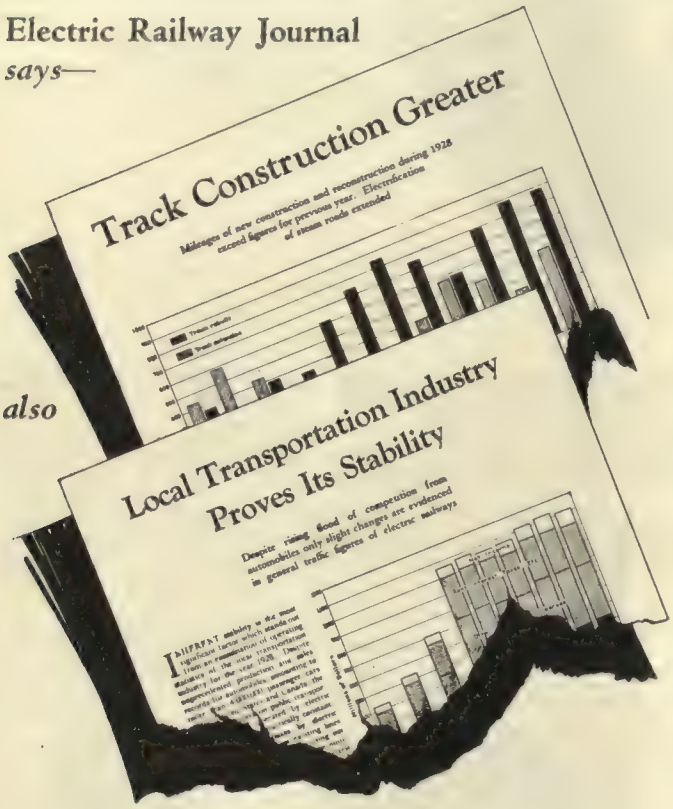
Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Two sides of a statisical story

Electric Railway Journal
says—



also

And we say:—

More track construction in 1928 meant more Thermit used—and more roads using it!

And we add:—

a stable industry can and must maintain its property for most efficient operation and longest life.

Thermit Welding has become the recognized standard of the railway companies which are proving their right to stay in the transportation business. Five out of six winners of the Coffin Award use it. Nearly all the big city systems are numbered among the Thermit clientele.

Thermit makes a smooth, quiet running track, free from joint trouble for the life of the rail itself. It's better all the time, and it proves its positive economy when other types of rail joints begin to wear out.

THERMIT

THERMIT

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PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



One of the cars to which Simplex Clasp Brakes have been applied

SIMPLEX MULTIPLE UNIT CLASP BRAKES

Railroads would not purchase passenger cars without "Simplex Clasp Brakes."

Why not specify "Simplex Multiple Unit Motor and Trailer Truck Clasp Brakes" for Gas — Electric and Electric Cars.

Send us your inquiries for information and designs.

The mechanically correct Brake for a Modern Car.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

One tiny vulnerable spot — Death found it!

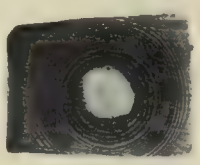


THETIS, goddess mother of mortal Achilles, Hellenic hero of Trojan war, plunged him into the River Styx to make his body invulnerable. But she held him by one heel, which the waters did not cover with their protective charm. Before the bloody walls of besieged Troy, Achilles wrought havoc and destruction among the Trojans, himself escaping wounds, defying harm. And then, as he stood in the temple of Apollo, negotiating with Priam for the hand of his daughter, Polyxena, the poisoned arrow of treacherous Paris found his vulnerable heel, dealing death. The magic of the Styx was good protection as far as it went. But its application had lacked thoroughness.

It is fact, not legend, that destructive termites (white ants), woodpeckers, decay-producing fungi or marine borers are swift to find the vulnerable spots in partially-improperly or under-treated transmission poles, cross ties, bridge timbers or piling. Spotty or uneven penetration of the preservative does not afford complete protection. And treated wood is no safer than its least protected spot.

Thoroughness distinctively characterizes Prettyman timber preservation. The most complete and modern pressure treating plant in the industry, coupled with finished engineering skill and care, assure deep and uniform penetration full length to the heartwood with creosote oil conforming to standard A. R. E. A. specifications. It completely encases the heartwood in highly toxic sheathing, thick as the sapwood itself. It leaves no vulnerable spots. Yet, Prettyman Preserved Forest Products cost no more. Write for prices.

No vulnerable spots here!



PRETTYMAN PRESERVED FOREST PRODUCTS P29

Note thorough penetration of creosote oil

J. F. Prettyman & Sons
Wood Preserving Plant
Charleston, S. C.

1928 records of buses bought by electric railways show

TwinCoach 1st

in large capacity buses bought

TwinCoach 2nd

in total buses bought

here's the record . .



Table II—Buses Bought by Railways During 1928

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Arizona					
Warren Co.	6	4	Studebaker	Superior	21
		2	Twin Coach	.....	40
Arkansas					
Arkansas Power & Light Co.	4	4	White	Bender	17
California					
Bakersfield & Kern Elec. Ry. Co.	1	1	Graham	Graham	21
Key System Transit Co.	41	40	Twin Coach	Twin Coach	40
		1		A. C. F	37
Los Angeles Railway	27	9	White	Bender	29
		3	Fageol	Fageol	29
		11	Twin Coach	Twin Coach	40
		2	.....	Fageol	58
		2	Yellow	Yellow	63
Pacific Electric Ry.	30	13	Fageol	Fageol	58
		5	Twin Coach	Twin Coach	40
		6	.....	Yellow	63
		*3	Moreland	Moreland	59
		3	Fageol	Fageol	19
Pacific Gas & Elec. Co.	1	1	Yellow	Yellow	21
San Diego Electric Ry.	4	4	Twin Coach	Twin Coach	40
Southern Pacific Co.	61	17	.....	.....	29
		2	.....	.....	28
		2	.....	.....	27
		9	.....	.....	26
		1	.....	.....	25
		11	.....	.....	22
		8	.....	.....	21
		5	.....	.....	17
		2	.....	.....	16
		3	.....	.....	14
		1	.....	.....	11
Colorado					
Denver Tramway	2	2	Mack	Mack	25
Connecticut					
Connecticut Co.	14	5	Mack	Farnham-Nelson	29
		9	Yellow	.....	29
Groton & Stonington Traction Co.	10	10	Twin Coach	Twin Coach	37
Lordship Railway	2	2		Mack	29
New Haven & Shore Line Ry.	3	*3	A. C. F.	A. C. F.	29
Delaware					
Delaware Electric Power Co.	7	2	Yellow	Yellow	29
		*5	Yellow	Yellow	29
District of Columbia					
Capital Traction Co.	5	3	Yellow	Yellow	21
		2	Yellow	Yellow	29
Washington Railway & Electric Co.	23	6	Yellow	Yellow	21
		8	Yellow	Yellow	29
		5	Yellow	Yellow	21
		*3	Graham	Graham	20
		*1	Yellow	Yellow	21
Florida					
Jacksonville Traction Co.	4	4	Twin Coach	.....	40
Georgia					
Savannah Electric & Power Co.	1	1	Mack	Mack	
Idaho					
Boise Street Car Co.	2	2	Graham	Graha	
Illinois					
Alton Ry.	5	*2	Reo	.....	18
		*3	Yellow	.....	21
Blue Goose Motor Coach Co.	5	3	Twin Coach	.....	40
		*2		Yellow	21
Chicago & Joliet Electric Ry.	6	5	Yellow	Yellow	29
		1	Mack	Mack	
Chicago & West Towns Ry.	6	1	Cummings Car & Coach Co.	Cummings Car & Coach Co.	30
		5	Mack	Cummings Car & Coach Co.	29
Chicago Surface Lines	3	3	Twin Coach	Twin Coach	40
Evanston Railway	7	7		.....	33
Illinois Power & Light Corp.	32	1	Mack	Mack	29
		5	A.C.F.	A.C.F.	30
		4	A.C.F.	A.C.F.	21
		1	A.C.F.	A.C.F.	27
		11	Yellow	Yellow	21
		6	Yellow	Yellow	29
		4	Yellow	Yellow	17
Illinois Traction System.	10	4	Studebaker	.....	21
		4	A.C.F.	.....	21
		1	A.C.F.	.....	29
		1	Yellow	.....	29
Kewanee Public Service Co.	2	2	Yellow	.....	21
Tri-City Ry. of Illinois.	6	*3	Yellow	Yello	21
		*1	Mack	Mack	29
		2	Mack	Mack	29
Indiana					
Beech Grove Traction Corp.	1	1	International	Bender	
Chicago, South Bend & Northern Indiana Ry.	3	3	Studebaker	Superior	21
Chicago, South Shore & South Bend R.R.	2	*2	International	.....	..
Evansville & Ohio Valley Railway	8	8	Yellow	Yellow	17–21
[illegible] Railways	1	*1	Yellow	Yellow	30
[illegible] Service Corp.	7	*4	A.C.F.	.....	31
		*3	Yellow	Yellow	

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Indianapolis & Southeastern R.R.	4	4	Studebaker	.....	22
Interstate Public Service Co.	3	2	Fageol	Fageol	30
		1	A.C.F.	A.C.F	30
Northern Indiana Power Co.	1	1	International	.....	14
Southern Michigan Ry.	3	3	Studebaker	Superior	21
Union Traction Co. of Indiana	11	9	White	Brown	29
		2	Mack	Mack	29
Iowa					
Cedar Rapids & Iowa City Ry.	9	5	Yellow	Yellow	26
		*2	Yellow	.....	21
		*2	Yellow	Fitzjohn	21
Clinton, Davenport & Muscatine Ry.	1	1	Yellow	Yellow	19
Fort Dodge, Des Moines & Southern R.R.	3	3	Yellow	Yellow	25
Interstate Power Co.	3	3	Mack	Mack	25
Iowa Ry. & Light Co. Marshalltown Div.	7	7	Yellow	Yellow	21
Iowa Southern Utilities Co. (Burlington)	4	4	Mack	Mack	25
Mississippi Valley Electric Co.	2	2	White	.....	25
Tri-City Ry. of Iowa	4	3	Mack	Mack	29
		*1	Yellow	Yellow	29
Waterloo, Cedar Falls & Northern Ry.	3	3	Yellow	Yellow	21
Kansas					
Arkansas Valley Interurban Ry.	1	1	White	White	15
Kansas Public Service Co.	3	3	Graham	Graham	21
United Power & Light Corp.	3	3	Graham	Graham	21
Kentucky					
Kentucky Traction & Terminal Co.	2	2	Yellow	Yellow	21
Louisville Ry.	21	2	Mack	Mack	29
		2	White	Bender	26
		1	White	Bender	29
		14	Studebaker	Superior	21
		2	Studebaker	Superior	14
Louisiana					
New Orleans Public Service, Inc.	7	7	Yellow	St. Louis Car Co.	34
Maine					
York Utilities Co.	1	1	Yellow	.....	..
Maryland					
Cumberland & Western-port Transit Co.	7	4	White	Bender	29
		3	Yellow	Yellow	29
Potomac Edison Co.	12	*1	International	Lang	30
		5	International	Lang	29
		4	Yellow	Yellow	21
		2	White	Lang	25
Massachusetts					
Boston Elevated Ry.	61	1	Safeway	Safeway	29
		1	Mack	International	29
		2	White	Farnham-Nelson	25
		1	White	Brown	29
		11	Twin Coach	Twin Coach	37
		†15	Twin Coach	Twin Coach	35
		†14		Versare	36
		†16	A.C.F.	A.C.F.	..
Boston, Revere Beach & Lynn R.R.	2	2	A.C.F.	.....	23
Boston, Worcester & N. Y. St. Ry.	2	2	Mack	.....	29
Eastern Massachusetts Street Ry.	15	*4	Mack	Mack	29
		5	Brockway	Brown	21
		6	A.C.F.	A.C.F.	29
Fitchburg & Leominster St. Ry.	4	4	Studebaker	.....	21
Interstate Street Ry.	7	1	A.C.F.	A.C.F.	29
		2	A.C.F.	A.C.F	27
		*1	Mack	Lang	25
		*3	A.C.F.	Fageol	29
Middlesex & Boston St. Ry.	12	12	White	Bender	29
Milford & Uxbridge Street Ry.	4	4	Mack	Mack	29
Northampton St. Ry.	1	1	Mack	.....	29
Plymouth & Brockton St. Ry.	6	5	Mack	Mack	29
		*1	Reo	.....	20
Springfield Street Ry.	11	3	Yellow	Yellow	29
		2	Yellow	Farnum-Nelson	29
		5	Yellow	Yellow	33
Union Street Ry.	1	1	Yellow	Yellow	29
Worcester Consolidated Street Ry.	24	14	Yellow	Farnham-Nelson	29
		10	Yellow	Yellow	33
Michigan					
City of Detroit—Dept. of Street Rys.	218	1	Graham	Graham	16
		16	Twin Coach	Twin Coach	40
		16		A.C.F.	40
		†25	A.C.F.	A.C.F.	40
		120	Graham	Graham	15
		40	Yellow	Yellow	16
Eastern Michigan Rys.	48	14	A.C.F.	A.C.F.	29
		4	Yellow	Yellow	29
		20	Yellow	Yellow	17
		10	Twin Coach	Twin Coach	40

Twin Coach
ctric.
R. FAGEOL KENTON, OHIO

Table II—Buses Bought by Railways During 1928—(Continued)

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Menominee & Marinette Light & Traction Co.	14	10	Reo	Fitzjohn	21
		4	Yellow	Yellow	29
Michigan Electric Ry.	1	1	A.C.F.	A.C.F.	
Saginaw Transit Co.	5	5	Yellow	Yellow	
Minnesota					
Twin City Rapid Transit Co.	15	6	Mack	Eckland	29
		7	White	Eckland	29
		2	Wills	Eckland	29
Missouri					
Kansas City Public Service Co.	7	6	Yellow	Yellow	21
		1	Twin Coach	Twin Coach	40
Springfield Traction Co.	1	1		Yellow	23
St. Joseph Ry. Lt., Ht., & Pwr. Co.	6	6	Yellow		21
St. Louis Public Service Co.	10	10	Twin Coach	Twin Coach	40
Nebraska					
Lincoln Traction Co.	5	5	Mack	Ma	29
New Hampshire					
Keene Electric Ry.	1	1	Graham	Grah	
New Jersey					
Atlantic City & Shore R.R.	4	4	Yellow		21
Coast Cities Ry. Co.	4	2	Yellow	Yellow	21
		2	Yellow	Yellow	29
Public Service Co-ordinated Transport	517	5	White	Bender	21
		†1	White	Bender	29
		†1	Mack	Mack	29
		4	Mack	Mac	29
		†331	Yellow	Public rvice	31
		1	Yellow	Yellow	33
		1	Yellow	Yello	29
		20	Yellow	Yell	21
		*152	Miscellaneous	Miscella eou	
		1	Yellow	Public S	
Trenton & Mercer County Traction Co.	2	2	Twin Coach	Twin Coach	40
New York					
Black River Traction Co.	2	2	Reo	Fitzjohn	21
Brooklyn City R.R.	4	4	White	Bender	29
Hudson Valley Ry.	24	†24	Mack		
International Ry.	10	†10	Yellow		
Jamestown Street Ry.	4	4	Reo	Fitzjohn	21
Kingston Consolidated Railroad	1	1	Yellow		29
Newburgh Public Service	16	16	White	Bender	21
New York & Stamford Ry.	12	12	Mack	Mack	29
Niagara Gorge R.R.	4	4	Pierce Arrow	Buffalo Body Corp.	
Poughkeepsie & Wappingers Falls Ry.	3	1	A.C.F.	A.C.F.	23
		2	A.C.F.	A.C.F.	29
Syracuse & Eastern Railroad	1	1	Reo	Fitzjohn	25
Third Ave. Ry. System.	136	26	Six Wheel	Fitzgibbon	56
		56	Safeway	Fitzgibbon	29
		40	Versare	Versare	37
		14	A. C. F.	A. C. F.	23
United Traction Co. Albany	7	7	Versare	Versare	
North Carolina					
Durham Pub. Serv. Co.	2	2	Yellow	Yellow	21
North Carolina Public Service Co.	7	2	Graham	Graham	21
		5	Yellow	Yellow	23
Southern Public Utilities Co.	6	3	Graham	Graham	21
		3	Yellow	Yellow	21
North Dakota					
Northern States Power Co.	1	1	Reo	Fitzjohn	21
Ohio					
Cincinnati Street Ry.	12	8	Twin Coach	Twin Coach	40
		4		Yellow	29
Cleveland Ry.	21	20	White	Lang	29
		1	Twin Coach	Twin Coach	37
Community Traction Co.	88	3		Mack	29
		3	White	Bender	29
		3	White	Bender	33
		12	White	Lang	33
		12	Yellow		29
		14	Yellow	Yellow	33
		12	Yellow	Lang	33
		10	Twin Coach	Twin Coach	40
		*9		Union	21
		*5	Studebaker	Gibraltar	21
		*5	Reo	Fitzjohn	21
Indiana, Columbus & Eastern Traction Co.	3	3	White	Bender	24
Lake Shore Elec. Ry.	3	3	White	Bender	25
Northern Ohio Power & Light Co.	64	39	Twin Coach	Twin Coach	
		10		Lang	
		*6	White	Bender	
		*1	Pierce Arrow	Brown	
		*2	Mack	Mack	
		*1	Yellow	Yellow	
		*1	Fageol	Fageol	29
		*3	Garford	Garford	17
		*1	Stoughton	Stoughton	20
Ohio Public Service Co.	2	2	Yellow	Yellow	21
Oklahoma					
Oklahoma Ry.	7	3	Graham	Graham	21
		4	Yellow	Yellow	21
Oklahoma Union Ry.	4	3	Mack	Lang	25
		1	Buick		14
Tulsa Street Ry.	1	1	Yellow	Yellow	21
Oregon					
Portland Electric Power Co.	3	3	Twin Coach	Twin Coach	40
Pennsylvania					
Citizens Traction Co.	10	10	A.C.F.	A.C.F	23
Conestoga Traction Co.	2	2	International	York	25
East Penn Traction Co.	4	3	Mack	Mack	29
		1	Hahn	Hahn	23
Erie Rys.	9	7	Yellow	Yellow	21
		2	Yellow	Yellow	23
Johnstown Traction Co.	7	7	Yellow	Yellow	29
Lehigh Traction Co.	1	1	Mack	Mack	29
Lehigh Valley Transit Co.	1	1	Mack	Mack	29
Lewistown & Reedsville Electric Ry.	4	4	White	Bender	29
Philadelphia & West Chester Traction Co.	6	3	White	Bender	29
		3	White	Bender	21
Pittsburgh Railways	24	17	Twin Coach	Twin Coach	35
		4		Yellow	29
		3	Yellow	Yellow	17
Reading Transit Co.	2	1	White	Bender	21
		1	Mack	Mack	29
West Penn Rys.	34	7	Graham		
		2	Yellow	Lang	21
		*25	Miscellaneous		
Wilkes-Barre Ry.	16	7	Yellow	Yellow	29
		*5	Reo	Reo	21
		*4	Mack	Local	18
Williamsport Rys.	3	1	Reo	Reo	16
		1	Reo	Reo	18
		1	Reo	Reo	21
Woodlawn & Southern St. Ry.	1	1	Mack	Mack	29
Rhode Island					
Newport & Providence Ry.	28	*20	Fageol		29
		*1	White		29
		3	White	Bender	29
		4	Twin Coach		34
United Elec. Rys.	30	†2	Twin Coach	Twin Coach	40
		28	Twin Coach	Twin Coach	40
South Dakota					
Sioux Falls Traction System	2	1	White	Eckland	21
		1	White	Eckland	25
Tennessee					
Tennessee Electric Power Co.	6	3	Yellow	Yellow	29
		3	Twin Coach	Twin Coach	40
Texas					
Dallas Railway & Terminal Co.	2	1	Graham	Graham	21
		1	Graham	Graham	16
Eastern Texas Electric Co.	11	3	Reo	Fitzjohn	21
		*1	Yellow	Yellow	21
		3	Yellow	Yellow	21
		4	Graham	Graham	21
Houston Electric Co.	23	23	Twin Coach	Twin Coach	40
Northern Texas Traction Co.	1	1	Reo	Reo	21
Nueces Ry.	3	*2	Reo		22
		*1	Studebaker		22
San Antonio Public Service Co.	29	15	White	Bender	34
		12	Reo	Fitzjohn	22
		1	Yellow	Yellow	22
		1	Studebaker	Superior	22
Wichita Falls Traction Co.	4	2	Mack	Mack	25
		2	Mack	Mack	29
Vermont					
Burlington Traction Co.	1	1	Twin Coach	Twin Coach	40
Virginia					
City of Radford, Dept. of Public Utilities	2	2	Graham	Graham	21
Roanoke Railway & Electric Co.	3	3	Yellow	Yellow	21
Virginia Electric & Power Co.	15	15	Twin Coach	Twin Coach	40
Virginia Public Service Co.	1	1		Lang	21
Washington					
Grays Harbor Ry. & Light Co.	2	2	White		29
Lewiston-Clarkston Transit Co.	2	2	Graham	Graham	21
Puget Sound Power & Light Co.	19	6	A.C.F.	A.C.F.	29
		6	Yellow	Yellow	29
		2	Yellow	Lang	32
		2	White	Bender	33
		2	Twin Coach	Twin Coach	37
		1	Twin Coach	Twin Coach	40
Seattle Municipal Street Ry.	17	10			21
		5	Mack		29
		*1	White		29
		*1	White		25
West Virginia					
Charleston Interurban R.R.	12	6	Yellow	Bender	
		4	Yellow	Yellow	
		2	Yellow	Yello	

*Second-hand. †Gas

Twin Coach by F.D. FAGEOL KENT, OHIO

Table II—Buses Bought by Railways During 1928—(Concluded)

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Monongahela West Penn Public Service Co.	14	2	Yellow	Yellow	21
		1	Yellow	Yellow	31
		6	Yellow	Lang	21
		4	Graham	Graham	21
		1	Graham	Graham	16
Ohio Valley Electric Ry.	15	5	Yellow	Yellow	21
		10	White	Bender	25
Tyler Traction Co.	1	1	Yellow	Yellow	29
Wheeling Traction Sys.	5	2	Graham	.....	16
		3	Graham	.....	21
Wisconsin					
Milwaukee Electric Ry. & Light Co.	18	1	Twin Coach	Twin Coach	40
		6	Yellow	Yellow	29
		4	Twin Coach	Twin Coach	40
		*2	Packard	Monday	30
		*1	Sterling	Monday	30
		*1	Stegman	Monday	18
		*1	Stoddard	Monday	18
		*1	Studebaker	Monday	18
		*1	Ford	Monday	18
Wisconsin Gas & Electric Co.	2	*2	5th Ave. Coach	.....	...
Wisconsin, Michigan Power Co.	6	4	Twin Coach	Twin Coach	34
		*2	White	.....	26
Wisconsin Power & Light Co.	15	10	A.C.F.	A.C.F.	29
		5	A.C.F.	A.C.F.	22
Wisconsin Public Service Corp.	20	10	Reo	Fitzjohn	21
		5	White	.....	29
		*5	Yellow	.....	29
Wisconsin Valley Electric Co.	1	1	Reo	Fitzjohn	21
Wyoming					
Cheyenne Motor Bus Co.	4	1	Reo	Fitzjohn	21
		3	Studebaker	.....	...

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Canada					
British Columbia Electric Ry.	5	4	Yellow	Yellow	29
		1	Yellow	Yellow	23
Dominion Power & Transmission Co.	17	5	Yellow	Yellow	21
		7	Reo	National Steel Car	21
		5	White	Bender	29
Montreal Tramways	12	†2	Versare	Versare	35
		2	Yellow	Yellow	21
		8	Yellow	Yellow	33
Moose Jaw Electric Ry.	3	3	Graham	Graham	21
Pictou County Electric Co.	2	2	International	Local	25
Sherbrooke Railway & Power Co.	2	2	Yellow	Yellow	21
Toronto Transportation Commission	34	2	Mack	Mack	29
		6	Yellow	Yellow	23
		10	Mack	Bender	29
		*1	Reo	.....	18
		*2	Reo	.....	21
		*1	Studebaker	.....	21
		*8	Gotfredson	.....	21–25
		*4	Mack	Mack	25
Winnipeg Electric Co.	17	7	G.M.C.	Local	25
		5	Mack	Local	25
		5	Twin Coach	Cummings Car	40
Honolulu, Hawaii					
Honolulu Rapid Transit Co.	2	2	A.C.F	A.C.F.	23
Total	2,455				

*Second-hand.
†Gas-electric.

a total of 318 Twin Coaches

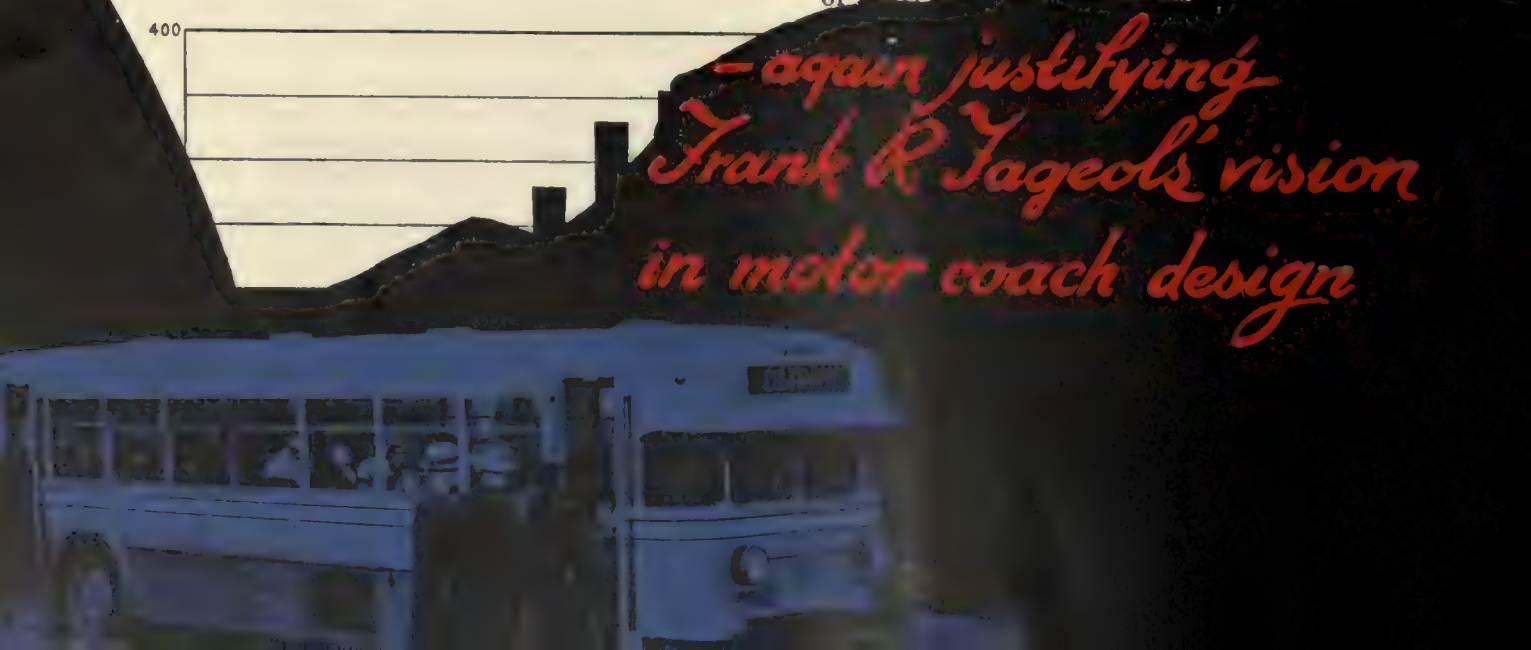
viously served by trolleys. In the majority of instances where abandonments were effected the reasons were purely economic, due to falling off in traffic and revenue or inability to meet heavy paving charges for expenses of grade separations, highway [illegible]

Thirteen electric railways not previously engaged in bus operation established bus service during 1928. These were all comparatively small installations. The principal extensions of route and purchases of new equipment were made by railways with long-established records as operators of automotive equipment. Several properties which had been providing bus service suspended operation during the year. Several others were absorbed in corporate combinations. Thus by the close of 1928 there were approximately 350 electric railways operating buses.

The largest purchaser during the year was the Public Service Co-ordinated Transport of Newark, N. J., which added a total of 517 buses to its fleet, already the largest in the country. Of the buses purchased 365 were new and 152 were second hand, taken over in the purchase of various independent lines throughout the state of New Jersey. This company scrapped or retired 177 buses from service, leaving [illegible] service at the close of the year.

The bus of large seating capacity, which was developed during the latter part of 1927, established its position in the industry to the extent that approximately 17 per cent of the new equipment purchased during the year was of this type.

[illegible] buses was further emphasized by the fact that of the total number purchased, nearly 1,000 were of the type seating from 29 to 33 passengers, and more than 100 others were of the type seating 25 passengers. A conspicuous [illegible] of small capacity buses was that of the [illegible] of Street [illegible]



[Reading time 15 seconds]

Modernize, Economize and Carry on with Operation

THAT was the common-sense program on which the Electric Railway Industry embarked a few short years ago.

But how far have we progressed in this direction?

Roads which *have* adopted modern equipment find it possible to operate with ever increasing economy and a corresponding gain in revenue. Then why have other properties hung back?

If It Has Paid 96 Roads to TREADLE-IZE It Will Certainly Pay You

NP

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

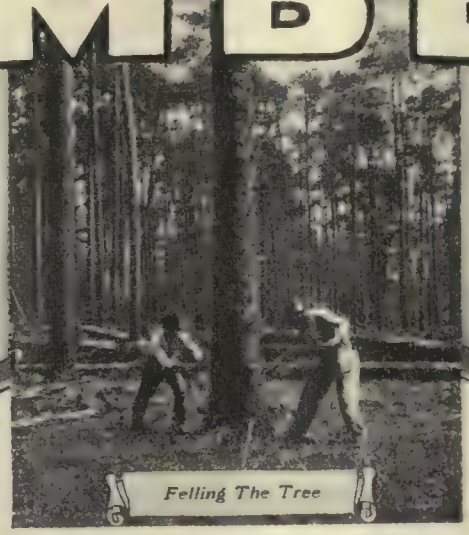
General Works, Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

SELECT TIMBER



Felling The Tree

SOUND timber is the foundation of ***International*** quality poles. Long, dependable service is the result.

The selection of the timber is paramount. ***International*** does not own timberlands and is, therefore, under no incentive to cut all of the timber, good and bad. Rather, it is free to select and purchase the cream of privately owned forests.

International poles are selected and inspected by competent men brought up in and thoroughly familiar with the characteristics of the timber of the southwest. They are trained to reject all poles that show decay, unsound knots, short crooks or that in any way fall short of a most rigid specification. Only sound poles are selected and passed for manufacture and treatment.

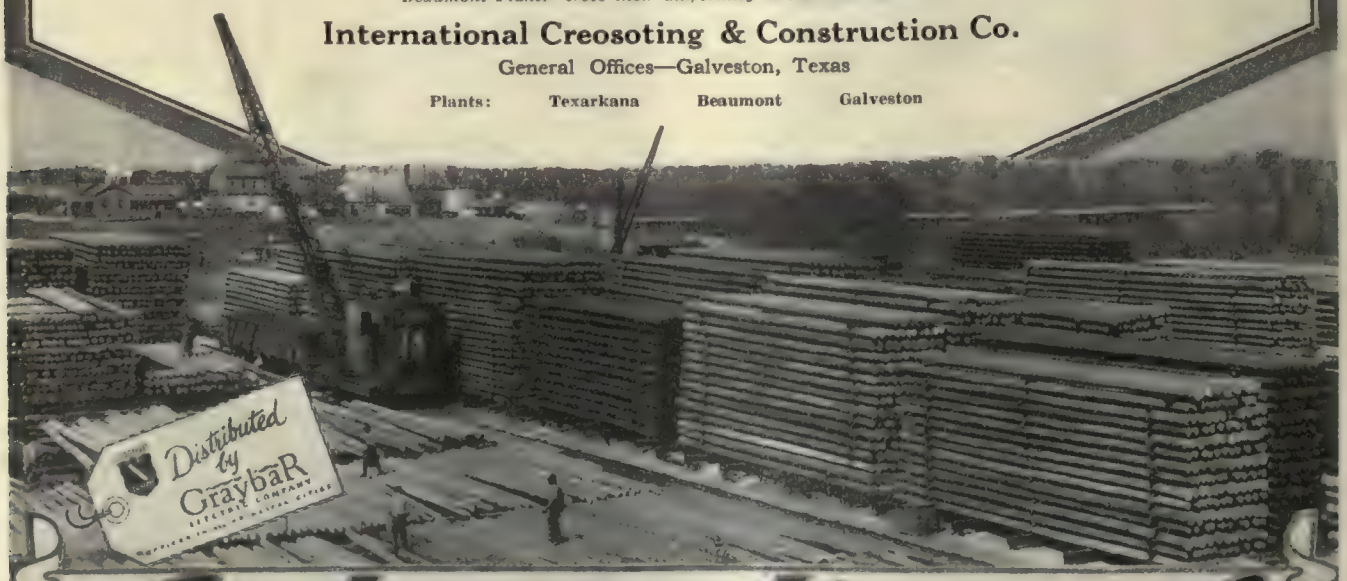
International has produced and treated poles long enough to know that its poles are still strong after 30 years' service.

The illustration below shows sound poles seasoning at the Beaumont Plant. Note their uniformity in size and stacking.

International Creosoting & Construction Co.

General Offices—Galveston, Texas

Plants: Texarkana Beaumont Galveston



International Creosoted Yellow Pine Poles



Why fares choose this motor coach

PASSENGERS naturally choose the well-lighted motor coach. Successful operators realize this and provide the *reading comfort* of bright interior lights. Good lights always make the trip seem shorter . . . the service more friendly.

And here is one sure way to get this result. Make certain that each one of your coaches is equipped with a capable power plant . . . a generator of the right capacity, backed by a *dependable storage battery.*

That is why the Exide Motor Coach Battery is used exclusively by hundreds of motor carriers. This battery was designed expressly for heavy motor coach service. Our company has been building dependable storage batteries for forty-one years and its engineers have a thorough knowledge of motor coach battery needs.

In the Exide Motor Coach Battery have been combined these essential qualities: (1) ruggedness for day in and day out service, (2) power for peak lamp loads, (3) scientific construction that results in lowest operating cost per mile.



Exide
MOTOR COACH BATTERY

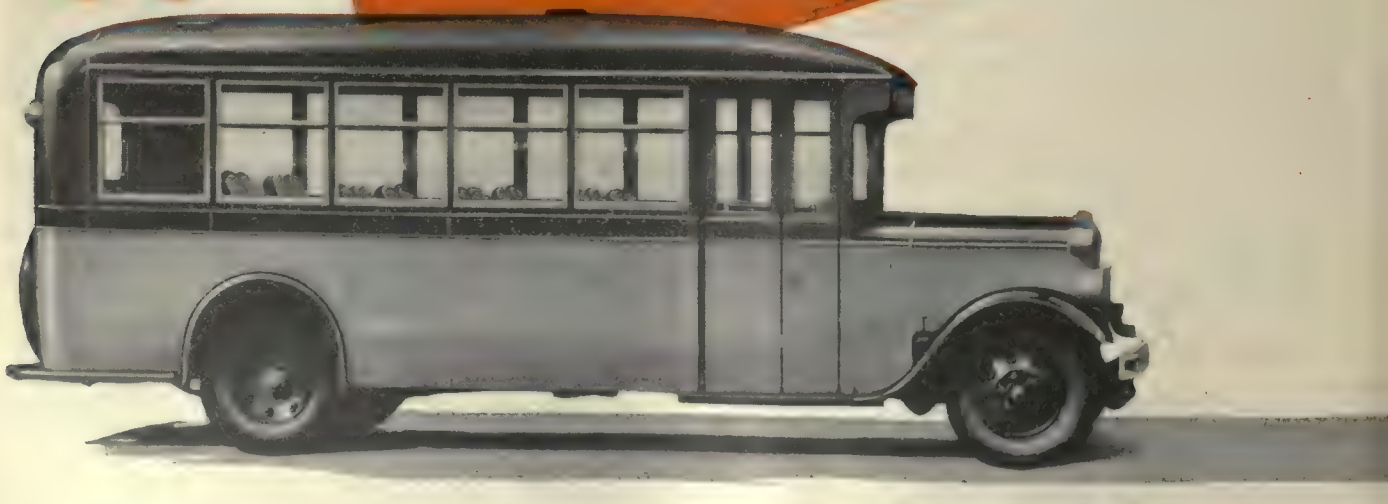
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

Yellow still leads

"Salesmanship may play a part in the initial purchase—but repeat orders are placed on the strength of performance and knowledge gained by experience."

TYPE W



Type W 21-passenger City Service

Leads in total bus sales

More Yellow Coaches were built and sold in 1928 than any other make of Coach.

Leads in sales to street railways

For the 5th successive year more Yellow Coaches were bought by Electric Railways than any other make of coach.

Leads in number of street railway customers

For the 5th successive year more Electric Railway Companies purchased Yellow Coaches than any other make of coach.

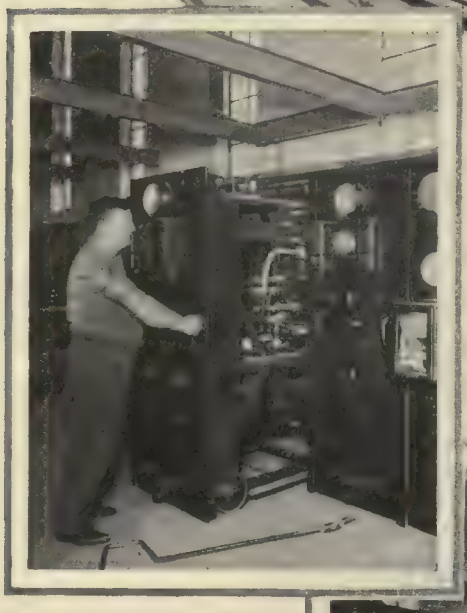
TYPE Z



Type Z 29-passenger City Service

Living up to the time-table

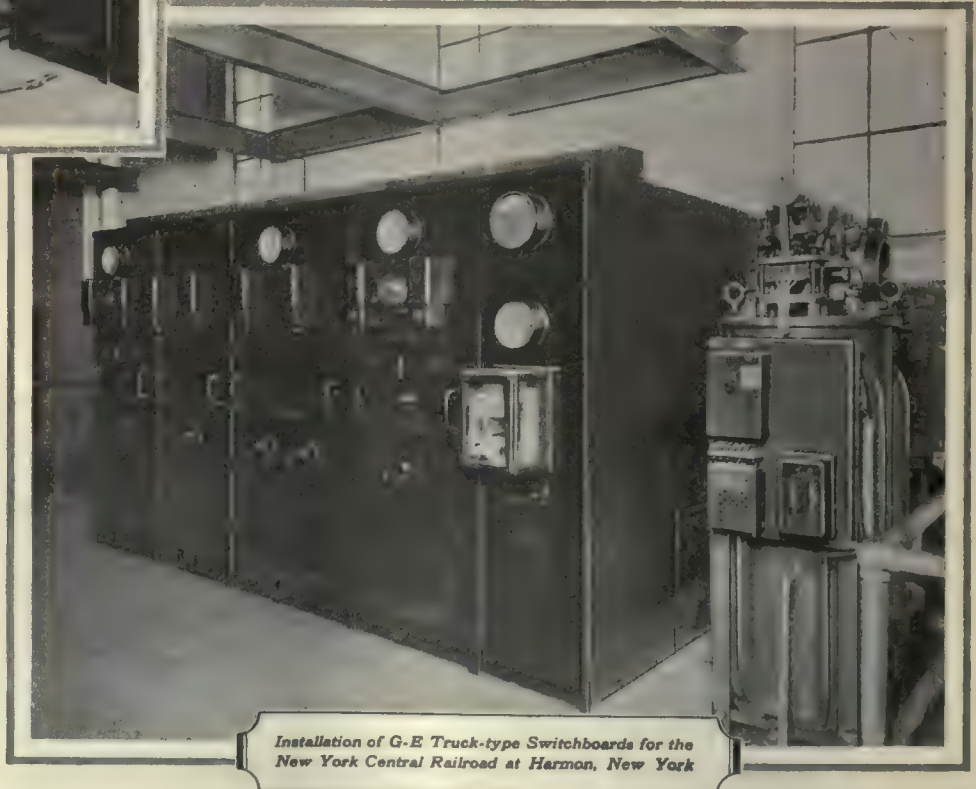




In the electrified zone of the New York Central Railroad, the mechanisms and apparatus which control traffic must not fail—trains must be on time.

General Electric truck-type switchboards, at Harmon and Port Morris, assist in maintaining continuity of service. Power and signal interruptions are minimized by the facility with which a spare truck can be inserted when it becomes necessary to withdraw a unit for inspection or repair. All live parts are enclosed and protected; this reduces fire hazard and practically prevents the danger of accident to personnel. Again, this type of switching equipment can be installed in the shortest possible time, for the units are completely assembled when shipped.

Consult any G-E switchgear specialist as to the application of G-E truck-type switchboards to your problem.



Installation of G-E Truck-type Switchboards for the New York Central Railroad at Harmon, New York

461-17

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
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Publishing Director

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A Constructive Move in Seattle

AFTER ten years of municipal ownership during which the people and city officials of Seattle have witnessed the gradual disintegration of their street railway property with little more than casual interest, the attention of the community is again focused on this issue by the report recently rendered by the Traffic Research Commission. Voluntarily organized some two years ago, the commission proceeded to employ able engineering counsel which has labored continuously and consistently to solve not only the pressing problems of the moment but to suggest as well a plan of rapid transit and urban transportation development that would serve the city for many years to come.

Briefly, the report submitted to Mayor Edwards and the City Council provides for a system of rapid transit subway and elevated lines, supplemented by a rehabilitated system of surface lines and feeder bus routes, the aggregate cost of which is estimated at approximately $20,000,000. In the course of its study the commission reviewed the financial condition of the present municipal railway system. Concluding that with steadily decreasing patronage the property could not possibly meet its obligations, the commission recommended that the purchase contract be rewritten so as to provide for a reduced annual payment. Believing that the lost patronage can be regained by providing improved facilities, the commission suggests that a modern rapid transit service be co-ordinated with the existing street railway. The commission decides that the trolley car is still supreme as a city transportation unit and must continue to carry the burden of the load. Surface cars are to be retained except on the one main thoroughfare through the business district under which the subway is to operate. The motor bus is recognized as a valuable auxiliary vehicle but is discarded as a substitute for rail service.

Perhaps the most interesting and encouraging phase of the general plan is the proposal that the enterprise be financed by special assessment against benefited property. The city is to be divided into districts, each of which is to be assessed for the cost of all permanent way and stations according to the estimated benefit to be received. Twenty-year assessment bonds are suggested to meet this obligation. The fare is to be so fixed that the rider will pay only for rolling stock and actual expenses of operation, maintenance and depreciation. Another bond issue, to be paid, together with interest thereon, out of receipts, is proposed as a means to finance necessary rolling stock.

Setting aside all question as to the advisability of Seattle burdening itself with so stupendous a financial load at this stage of its civic development, it is refreshing to note that, unlike certain proposals which have been made in the past, the report bears the sponsorship of a substantial element in the business community and shows evidence, furthermore, of sane, straightforward and constructive engineering thought. While the situation is as yet too complex to admit of any sweeping generalization, the return to constructive direction after having floundered around for a decade under the questionable guidance of political expediency, gives rise to the hope that Seattle's experiment may yet be worked out constructively.

New York's New Traffic Plan Starts Well

WITH an appropriately theatrical flourish, Police Commissioner Whalen's new traffic regulations were inaugurated in the theater district of New York City last Monday evening. Flashlights blazed and cameras clicked as the new plan went into effect. Despite its overly spectacular introduction, however, the experiment proved to be a marked success and those who came to scoff remained to praise.

More drastic than anything which has been tried before, the new scheme includes the elimination of all parking in the theatrical district, pedestrian control, prohibition of vehicular turning movements, a ban on commercial vehicles and cruising taxicabs, and last but not least, a shorter traffic signal cycle. As a result of these regulations street capacity was increased fully 100 per cent. Automobiles and taxicabs moved quickly four abreast instead of crawling slowly through a narrow lane. Delays at intersections were cut in half. The street cars moved at a speed reminiscent of the old days before congestion.

Despite the ban on cruising, no serious difficulty was experienced by hotel guests or restaurant patrons in securing taxicabs, as the number discharging passengers was ample to accommodate all the people who wished to leave the area. From the big railroad stations came reports that fewer travelers than usual missed trains. Practically everyone seemed pleased by the result of the experiment.

The first success of the new plan was due in no small measure to the energetic work of the large police force on hand. How well it will work when the 400 extra policemen have been returned to their normal duties is a question. Probably, it will be necessary to retain permanently a considerable number of these extra men. This, however, will be a small price to pay for an important improvement.

It is a question, too, whether the same regulations can be extended advantageously to other congested districts. Some modification is likely to be needed before this can be done. One point, however, stands out in bold relief. Traffic moved much faster with the short signal cycle. This change could be made immediately to advantage elsewhere throughout the city. While it can hardly be said that New York's traffic problem has been solved by

this single experiment, certainly Commissioner Whalen deserves hearty praise for his initial step in that direction.

There Is No Magic to Modernization

EVIDENCE continues to accumulate as to the value of modernization of the electric railway, and particularly as to the possibilities obtainable with new equipment. Even where the territory is so small that critics can see no possibilities, good management has been able to find a way out. Perhaps one of the most striking examples of this is seen in the record of the Lafayette Street Railway. For years it had been moribund. The physical property was in bad shape, the schedules were slow and uncertain, and the riding was limited. The company did not even own its cars, renting the most of them from another railway system. As a result of its difficulties the company went through a receivership with a drastic reorganization at the end, a new company being organized in March, 1922.

Fortunately the new management saw possibilities for service, even in a community of only 32,500 people. Immediately fifteen new cars were purchased, and within the past four years, three more have been added. The track has been rebuilt and the lines rerouted so as to eliminate tiresome waits on turnouts, and the schedule speed materially increased. The interurban cars that enter the city have been rerouted so as to eliminate interference with the city cars, and other things have been done to improve the regularity of service.

The effects of the new policy were almost immediate. The number of passengers increased more than 50 per cent the first year, and the growth in traffic has continued. Even though the fare was reduced from 7 cents to 5 cents there has been a material increase in revenue. Costs of operation have gone down greatly, due in large measure to the substitution of the lightweight cars for the heavy ones formerly used, and to the substitution of one man for two men. Despite the higher speed the accidents are fewer, the expenditures in this account for the past six years averaging less than one-quarter what they were under the old management.

Results such as these, while they may appear spectacular, can be obtained when the management has a realization of what the public wants and what it is willing to pay for, and then has a determination to furnish that service in the best manner possible. There is no magic to it.

Wanted: Young Blood

EVERY now and then a forward looking management, realizing the need for a thorough revision and modernization of its facilities and methods, starts out to find a young engineer capable of studying its system and bringing to bear upon current problems a fresh point of view and an analytical mind.

There is, however, a marked scarcity of young engineers of this type in the ranks of community transportation. The job requires an engineering background, supplemented with five or six years of electric railway experience—preferably divided among several departments. The man must have vision, imagination, and a knowledge of successful practices in the industry. He must have the ability to make a study of the practices of a given property with a view to eliminating inefficient methods and obsolete facilities. At the same time he must be able to keep in mind the major problems without losing himself in minor considerations of no great consequence. Finally, he must sell himself and his plans not only to the executives, but to the entire organization.

Such a man must have the courage of his convictions. He will encounter discouragements and even ridicule. He must be competent to pit his ideas against the prejudices of men with many years of practical experience. He should not discard a good plan just because he is told that it is impracticable. The "old timer" is inclined to brush aside suggested changes without giving them sufficient consideration. The industry has failed woefully to raise young men of this type. Those who start out to get experience are discouraged by lack of opportunity and inadequate pay. Does it not demonstrate that there are many electric railways that are not properly conducting one of the most important phases of modern industry—research? When, therefore, a progressive management seeks the type of man just described, the search is a long and difficult one. Frequently the qualifications demanded far exceed the limits of the remuneration offered. Does not this situation, therefore, indicate cause for considerable concern regarding an important phase of transportation management?

Stability of Costs Continues

STABILITY of financial elements in the industry has been most marked during the past few years. Following the violent upsets caused by the war, costs and fares have settled to a consistent level. This is very clearly shown in the charts prepared by Prof. Albert S. Richey and published in his article in the Jan. 12 issue of this paper. The maximum range of the various index figures over a five-year period has been far less than in any similar time in recent history. The greatest fluctuation in costs has been in operating materials, which have not in any year during this period varied more than 5.5 per cent from the average.

While construction costs have been almost stationary since the middle of 1923, it must be remembered that they are now established at approximately double prewar values. This in itself is sufficient explanation for the reluctance of managements to authorize projects unless there is every prospect of a fair return on the investment. It also explains why it frequently is found desirable to make extensions to service with the bus, where the initial investment is relatively small, rather than with the street railway, where the initial investment is relatively great. When the use of buses has demonstrated that the business is sufficient in volume to justify the construction of tracks, then the change can be made.

Stabilization of costs of construction and operation has, however, made it possible for the industry to plan with more confidence for the future than could be done when prices were fluctuating wildly. Few investors are willing to put their money into an enterprise with the knowledge that the physical plant may decrease rapidly in value due to a sudden recession in costs. Today, with small prospect of violent fluctuation in prices, it is possible to forecast the future with greater confidence and to put money into permanent construction where it can be justified. Expenditures made during the past year for track construction and rehabilitation, and similar expenditures planned for the present year, indicate that alert managements see the wisdom of this point of view. When the present uncertainty in the minds of

some operators as to the trend of car development has been cleared up, there seems to be no reason why there should be any risk, from the standpoint of money values, in the purchase of whatever equipment is necessary to round out the service needed to fill the requirements of the traveling public.

In two of the index figures definite trends are noticeable. These are fares and wages, both of which have shown steady advances for the past six years or longer. Relatively, the increase in wages is materially greater than the increase in fares, so that, while other elements of cost have not fluctuated greatly, the higher labor bill has absorbed most of the increment of revenue. As Professor Richey points out, the increase in wages is out of all proportion to the increase in the cost of living, the "real wages" of electric railway trainmen being 41 per cent greater than they were in 1913. In other words, the employee is able to increase his standard of living 41 per cent over what it was in the earlier year. This change should make possible the employment of men of a higher type than operated the cars fifteen years ago. Undoubtedly this has happened on many properties.

Not Afraid to Proclaim Its Ideals

OUT of a situation at one time discouraging to contemplate, the Eastern Massachusetts Street Railway has gradually worked its way to a place that has made the reclamation of the road a source of gratification to the management. The process has been a slow one, but it has been sure. For ten years the road has been under public trustees, and it started on Jan. 15 on another period of this kind to run for five years. The road's record has not been established without the promptings of a set of ideals, best reflected, perhaps in the New Year statement of the company republished elsewhere in this issue. They are ideals not foreign to most electric railways, but it is unusual to see them proclaimed publicly and put forward so militantly. The first had for its object the avowed intention of the company to continue to deserve the confidence and co-operation of 140,000,000 car and bus riders annually in nineteen cities and 54 towns in Massachusetts, and the second has for its object to convince the public completely that it is cheaper, speedier, safer and more comfortable to ride in the company's cars and buses than for the public to use its own automobiles.

So the list continues. There is no need to repeat it in full, or even to summarize it. But it is of interest in that it reflects the attitude of the company toward its patrons and puts its own men publicly on record as obligated courageously, truthfully and intelligently to meet all unjust criticisms of the road and to act promptly and decisively upon all well-founded complaints and advice for improvement of service. Also to follow up the campaign among trainmen for courtesy founded upon the most effective business maxim, "The customer is never wrong."

Particularly is the management to be commended for the attitude it has taken in regard to the parking evil. The statement may well be pondered by other railway men as an example in the public relations field which sets forth the obligations of the railway, and does not hesitate resolutely to call to public attention conditions the continuance of which the management feels work in some cases to prevent the approach of the service ideals by the railway to which it is publicly pledged.

Fuel Oil Tests Apparently Successful

EXPERIMENTS have been in progress for several years with a view to using low-grade fuel oil as a substitute for gasoline in automotive engines. For that reason particular interest attaches to the recent announcement by the Philadelphia Rapid Transit Company that it has developed with the co-operation of the manufacturer, a satisfactory device for accomplishing this purpose. The company proposes to equip all of its 570 city and interurban buses for using fuel oil within the present year. The practicability of the device will thus receive a thorough test on a large scale.

The chief advantage of using oil is its low cost as compared with gasoline. With fuel oil selling at 8 cents or less per gallon this difference is a substantial amount. According to P.R.T. engineers, the saving is 29 per cent in cost and 5½ per cent in quantity.

On the other hand, if fuel oil is widely used in automobile engines, it is probable that the price will rise—perhaps almost to the level of gasoline prices. Although the cracking of oil can be done cheaply in the large refineries, there will always be a cracking cost between fuel oil and gasoline which cannot be entirely offset by the value of the by-products obtained. Another consideration is the fact that crude oil has a larger B.t.u. value per gallon than gasoline and can be burned in an internal combustion engine with little waste.

There is little to choose between fuel oil and gasoline regarding convenience of supply. The device being used by the Philadelphia company uses a 38-42 Baumé oil, which is available as a furnace oil in practically all cities and which dealers deliver to large consumers just as they do gasoline. Furthermore, the buses can operate on either gasoline or fuel oil without any change of carburetor or exhaust settings. Thus if a bus should need to replenish its supply of fuel before returning to the garage, gasoline could be used.

Some doubt has been felt by automotive engineers that fuel oil might have a detrimental effect on the engine and consequently increase the maintenance cost. Of course the fuel oil does not actually enter the engine, but is vaporized in an outside retort. After operating a bus on this fuel for 250,000 miles, the P.R.T. has not noticed any difference in the engine and has maintained it on the exact same schedule as the buses which are using gasoline.

Whether the oil-burning engine will be as flexible as the gasoline engine in traffic remains to be seen. Thus far the experiments seem to indicate an entirely satisfactory rate of acceleration.

It is not likely that the development of this apparatus for using fuel oil in place of gasoline will revolutionize automotive engine design. Manufacturers of private automobiles have investigated this question thoroughly and have come to the conclusion that gasoline is a more satisfactory fuel. To the individual automobile owner the price of fuel is a comparatively unimportant factor. With the bus operator however, the situation is quite different. A saving of only a few cents per gallon in his fuel bill amounts to a tremendous sum in the course of a year. If such a saving can be made by means of this device for burning fuel oil its popularity is assured. Certainly this is an experiment that was worth trying, and in making it the Philadelphia Rapid Transit Company has made a substantial contribution to the progress of the industry.

Modernization Increases Riding in Lafayette

Adequate, fast and comfortable service, operating economies, and an intensive cultivation of good will are factors which have contributed to the success of the local street railway



Looking east toward Lafayette, Ind., across the levee and bridge spanning the Wabash

LAFAYETTE and West Lafayette, Ind., on the banks of the Wabash, with a combined population of only 32,500 have a thoroughly modern street car system which is making money—sufficient to maintain equipment and property in first-class shape and to provide a fair return on the investment. Back in 1913 the system, originally independent, was being operated as part of the interurban line of the Fort Wayne & Northern Indiana Traction Company. It was equipped with rented cars and burdened with a bonded indebtedness of $225,000. The years immediately following were accompanied by a succession of difficulties. The war brought rising costs. Influenza laid a paralyzing hand on traffic. A bad flood carried out the principal bridge between Lafayette and West Lafayette, thereby breaking the traffic connection with Purdue University and the residences of its 3,000 students. Then a few enterprising automobile owners began to carry passengers over the remaining bridge for a 5-cent fare. The number of these jitneys doubled and trebled as the business proved lucrative, and the restoration of the main bridge—to which the street car company contributed approximately $35,000—only enhanced their revenues.

Net earnings of the company declined steadily and after the default of bond interest, taxes, and stipulated payments on the new bridge in 1919, 1920, and 1921, the creditors petitioned for a receiver. Cars and track were in bad shape, schedules were slow, transfer connections uncertain and through routing of passengers between the two municipalities unheard of. If people used the street cars at all it was only because they had to.

In March, 1922, the property was offered at public auction. An old amusement park brought $6,000; the local public utility paid $95,000 for the railway power plant, and the street car property and such equipment as had not been rented finally were purchased for $75,000 by a group of local citizens. The capitalization of the new company, the Lafayette Street Railway, Inc., was fixed at $300,000, of which $200,000 was in twenty-year, 7 per cent bonds sold at par, and $100,000 common stock.

A program of new cars, rerouting of lines, and service improvements was commenced coincident with the passage of ordinances by Lafayette and West Lafayette officials which barred the jitneys from the streets used by the company's cars. Tracks were relaid with heavier rail where needed, double track extended on the levee



The corner of Ninth and Main Streets is the junction of lines which serve the north, south and east sections of Lafayette

and through the business section of Lafayette, and through routing of cars started with the abandonment of loop lines about the Court House Square.

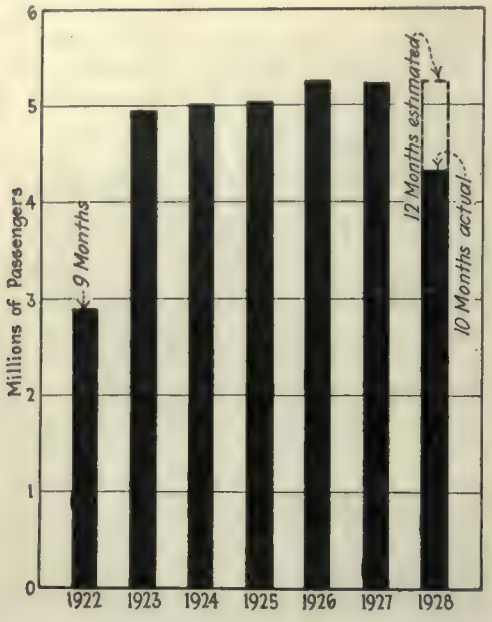
Fifteen Birney cars were purchased. They were financed to the extent of $50,000 by the issue of car trust obligations, all of which have since been discharged. Three additional Birney cars have been added during the past four years as the service requirements expanded. Since the new company pays 50 cents an hour as compared to the 1922 wage scale of 36 cents an hour, and in addition has to maintain signalmen at three steam railroad crossings, the introduction of these one-man cars has cut the labor item only about 27 per cent. Nevertheless, this represents a substantial saving in the cost of operation.

Energy is no longer generated in the railway's own plant, this having been disposed of as a separate unit at the receiver's sale in 1922, but is purchased at advantageous rates from a local electric company. By purchasing its power the railway company has been able to save a large sum.

Another material reduction in expense has been achieved by the elimination of burdensome assessments for the use of the streets and the bridge. The railway



Interurban cars from Fort Wayne and from Indianapolis discharge passengers adjacent to the carhouse of the local company instead of on the main business thoroughfare as formerly



Total passengers carried in 1928 are expected to equal or better all previous records

is at present obligated only to maintain the pavement between its tracks. Except for such expense as is incurred by the extra heavy foundation for paving in those streets through which its tracks run, the company does not have to pay for the initial paving installation or its renewal. The paving of North Salisbury Street in West Lafayette which has just been completed is illustrative of the working of this arrangement. The railway availed itself of the opportunity presented by the tearing up of the street to renew with 80-lb. T rail approximately 3,000 ft. of its track on this street at a total cost of $16,872 for new oak ties, rails, concrete, special work and a bonus for speedy completion of the job. The actual paving cost to the railway was only that involved in the extra excavating and the heavier foundation work required under the tracks.

Interurban Terminal Changed to Eliminate Congestion

Formerly the interurban cars of the Indiana Service Company from Fort Wayne and the interurbans from Indianapolis of the Terre Haute, Indianapolis & Eastern Traction Company were accustomed to discharge and load passengers at the Public Square. This procedure delayed the local cars. One of the first moves of the new management was to locate an interurban station at Ninth and Ferry Streets adjacent to its carhouse and only one block removed from the main business thoroughfare, where separate tracks could be employed to take care of this business. Interurban cars entering Lafayette at the present time proceed directly to this terminal before discharging their passengers or baggage.

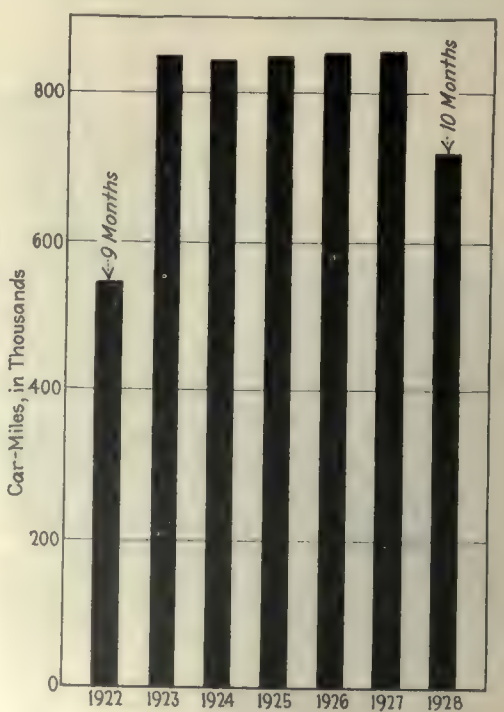
During the early part of the present year all the cars on the system have been thoroughly overhauled, motors and control equipment restored to good condition and the cars themselves cleaned and painted inside and out. Special attention has been directed to keeping the overhead lines in good shape with a view to minimizing service interruptions. New trolley wire replaces old before the latter becomes dangerously worn; switch frogs are frequently inspected and replaced if necessary; turnouts are carefully checked up, and new span wires are substituted for those in poor condition. Slack is taken up regularly every spring and restored with the coming of cold weather. Section insulators are replaced regularly every four months. In this way much of the usual grief and delay caused by trolley breaks is anticipated before it occurs.

Accidents Greatly Reduced

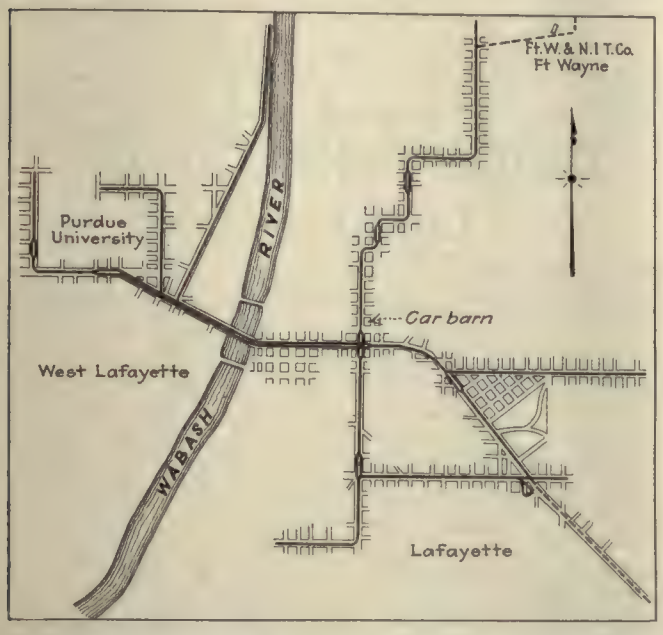
Electric gongs are used on all cars and, it is believed, have served materially to reduce the number of vehicular accidents and to clear the right-of-way for the movement of the cars. Lafayette, like any other city of equivalent size, has its downtown traffic and parking congestion. According to figures compiled by the Lafayette Motor Club, motor car registrations have increased approximately 102 per cent in the city and adjacent territory during the past seven years. The increase in population has been about 19 per cent.

In spite of increased speed of operation and a much stricter interpretation of what constitutes chargeable accidents, the sum expended annually in the settlement of property damage and personal injury claims has been reduced greatly. Using the sum spent in settlements in 1922 as a yardstick with an index figure of 100, the expenditures for damages during the succeeding years have been 44.6, 36.3, 6.7, 11.8, 28.3, and for ten months of 1928, 3.0 per cent. Since the 1922 figure is for only nine months, the percentages for the following years are in reality even better than the comparison would indicate.

Whereas in the first nine months of 1921 the old company carried 2,045,172 revenue passengers, the new company carried 3,094,018 in a similar period in 1923 and 3,098,516 in 1924, an increase of over 50 per cent. This advantage was improved materially in 1926 and 1927 with a still further increase anticipated for the present year. The gain has more than offset the reduction in fares from 7 cents to 5 and the introduction of the free transfer. The street car company has received the hearty



Extensions to system now being contemplated will increase the total car-miles operated in the coming year



The railway system brings Lafayette and West Lafayette close together in social as well as business affairs. Total of main and second tracks and sidings is 16.4 miles

co-operation and patronage of the public simply because, as at present rendered, the service meets the specifications of what the populace considers attractive and convenient transportation. The street cars have been made easy to use and the railway management by a variety of public contacts and pronouncements has let it be known frequently that the communities' support has been appreciated. Promises made by the new management have been scrupulously fulfilled and the confidence of the people obtained and strengthened during the nearly six and one half years of local ownership and management of the railway utility.

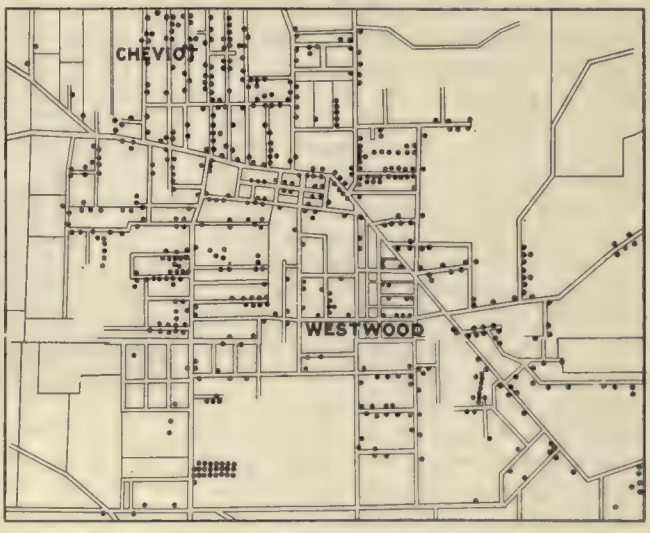
Briefly recapitulated, the factors which have apparently made for success in the operation of this small street railway have been the elimination of the jitney, the substitution of purchased power for that formerly generated in the railway plant, the immediate introduction of new one-man cars, the through routing of Lafayette and West Lafayette car lines with some rerouting of the latter, the general rehabilitation of track and overhead with purchase of electric switches and automatic block signals, the determination to give adequate, speedy, comfortable and courteous service under all circumstances, and, finally, the mutual good will arising from local ownership and management.

Buses Solve Unusual Traffic Problem in Cincinnati

RECENTLY the Cincinnati Street Railway was confronted with the problem of providing transportation for a new high school which was located in a sparsely settled section. This location was chosen by the Board of Education in anticipation of future development, but at the present time is located between two other residential sections, Price Hill on the one side and Westwood-Cheviot on the other. Operation of eight Twin Coaches on special routes has successfully solved this problem.

Cincinnati is a city of many hills with the residential sections on the highlands away from the basin or business section of the city. This residential development has been along the arteries and ridges and hills expanding in a fan-shaped area from the central district. The transportation system naturally was developed to connect these different residential sections with the business center of the city as these arteries formed the natural course of travel.

The location of the new high school on the outer edge of the fringe of the fan-shaped residential development bore no relation to the then existing systems of transportation. Naturally a great deal of pressure was brought upon the Cincinnati Street Railway to connect



Spot map prepared by Cincinnati Street Railway to show homes of high school pupils in Western Hills section



Fleet of Twin Coaches which handles Cincinnati school traffic

the outlying residential sections with a car line passing in the vicinity of the new high school, but as there was very little natural interchange of traffic between these two communities, each of which had its direct connection with the business center of the city, it did not appear to be advisable to go to the expense of constructing a car line of 2.5 miles merely for serving the high school for two very brief periods each school day. Wishing to co-operate in every way possible in what it regarded as a local transportation problem, the Cincinnati Street Railway set about to devise ways and means of handling this passenger movement, but decided to employ buses for the purpose.

As the district which it was proposed to serve included a considerable area, Joe R. Ong, transportation engineer of the Cincinnati Street Railway, procured from the high school principal the names and addresses of every pupil living within the Westwood-Cheviot section. With this information available, maps of the district were prepared, showing with a dot the location of each child's home. The map was then studied carefully and routes laid out which would serve the greatest number to the best possible advantage. No attempt was made to have door-to-door pick-up, but regular stopping places at the corner along the route were used for boarding and alighting passengers. Eight distinct routes were selected, each served by one of the large capacity Twin Coaches which were purchased by the company for this purpose.

The schedules provide for each bus to arrive at the Western Hills High School at approximately 8:10 to 8:15 a.m., from which point they proceed to the Elder High School and the Seton Academy, arriving there about ten minutes later. In the afternoon the process is reversed, with the buses starting from the Elder High School and proceeding by way of the Seton Academy to the Western Hills High School, where they arrive in time to leave at about 3:15 p.m. Due to the length of the route it is only possible to use each bus for one trip morning and evening, except that one bus returns for a 4:15 trip from the school for those who have stayed late for orchestra or band practice, dramatic work or to make up deficiencies.

The school fare in Cincinnati is 5 cents, and the service, which has the approval of Edgar Dow Gilman, Director of Public Utilities, is arranged for in the city-control service-at-cost franchise under which the Cincinnati Street Railway is operated. The original plan for service to the school, as proposed by the school authorities, contemplated a double-track car line before mentioned, construction of which would have cost approximately $300,000, but the employment of buses was finally decided upon as a more favorable solution for the students in the Westwood-Cheviot areas. The Cincinnati Street Railway did make an extension of its Warsaw Line from Price Hill to the vicinity of the new school, so that an extension of approximately ⅜ mile adequately cared for the students coming from the Price Hill section. The service to the others by the use of buses has proved entirely satisfactory. During the summer months the buses are used in handling traffic to a near-by amusement resort.

Double Trolley Catenary Construction

THE accompanying illustrations show a novel form of catenary construction with two trolley wires supported from a single messenger. They are on a section of track belonging to a high-speed German electric railway between Mettmann and Wülfrath in the Ruhr district, not far from Düsseldorf and Essen. The road is a 750-volt line, operating over city track at the termini, and using bow collectors. Most of it is single track. Two overhead wires are used, as in this country, partly for additional conductivity and partly to save the necessity of installing overhead frogs at the beginning and end of turnouts.



Novel overhead catenary construction on German interurban railway

Two trolley wires are used, and the overhead construction is divided mechanically into sections, as shown at the left, and electrically in sections, as shown at the right.

The first illustration is also interesting because it shows the method of dividing the overhead line mechanically into sections, the tension on each section being regulated by a pulley and counterweight. One end of each section is dead-ended to an anchor pole. Two poles of this kind are shown in the illustration. The second view shows a section insulator and the method of protecting the sections against lightning discharges by a horn arrester which is carried on the pole. The two pictures show that the mechanical sections are not co-terminous with the electrical sections.

The catenary construction is not used on all parts of the line. On other sections flexible brackets are employed. The line is part of quite an extended city and interurban railway company known as Mettmanner Strassenbahnen, G.m.b.H.

New Group of

Standardized Cars Designed

J. G. Brill Company develops eight distinct electric car models, six for city service and two for interurban. General features of these designs outlined at New York Electric Railway Association meeting

By George Frey
General Sales Manager J. G. Brill Company, Philadelphia, Pa.

FOR the past few years the subject of modernization has been foremost in our minds. Every-day luxuries, if we may call them such, and the advent of individual transportation have taught us that we must develop street cars in keeping with the times. Our combined industry has left the worst behind it. The time has arrived now to modernize the street railway, and it is going to be done.

In keeping with the general trend and believing that the electric railways need rolling stock which will attract revenue-producing passengers and at the same time afford necessary efficiency and economy in manufacture, operation and maintenance, the J. G. Brill Company has developed a new line of standardized cars. Uniformity in design of general, sectional and end construction under this principle has the economic advantages that naturally attend mass production manufacture, such as lower first cost and the stocking of maintenance parts, either by the railway store department or the manufacturer.

The new line of cars was developed after a complete analysis and study of the railway transportation needs in various classes of service. Any character of electric railway transportation up to multiple-unit train service comes within its range. The complete system includes six types of city cars and two types of interurbans. The city cars are classified as single-end, four-wheel; double-end, four-wheel; single-end, eight-wheel; double-end, eight-wheel; single-end, eight-wheel, center-exit; and single-end, twelve-wheel, duplex articulated. The interurban cars are classed as single-end, eight-wheel, high-speed passenger; and single-end, eight-wheel, high-speed passenger and merchandise dispatch. The single-end cars appear to be the most desirable from the standpoint of weight, carrying capacity, general arrangement, convenience and maintenance costs.

Details of the Car Body

The car body frame is constructed of metal, designed to withstand severe operating and climatic conditions and speeds up to 60 m.p.h. This construction is somewhat stronger and heavier than is theoretically necessary to withstand collisions and side-swipes, and is sufficiently strong to carry three times the seated load. The metal frame is filled or furred with wood, treated with preservatives, to receive the interior finish and appliances. The wood framing, incidentally, aids in reducing noises to a minimum. The general cross-section dimensions of the car body are given in Table I.

The bodies have curved lower side girders, with a single sweep from the belt to the side sill, and a skirt below the side sill. Double longitudinal battens at the belt and skirt give a streamline effect for painting. The letter panels are deep, and all window sills are on the same horizontal plane. The windows are wide and single, and are designed to raise. The crown of the arch roof is 14½ in. These body proportions and details of design, with 26-in. or 28-in. wheels, create a pleasing general exterior appearance.

Both vestibule ends are alike to reduce the variety of replacement parts and to simplify manufacture. They are of the automotive type, with two large center panes of glass slightly inclined and two small wing panes, with an overhead metal sun visor and a ventilator behind the visor. The end vestibule glass is stationary. The operator is seated at all times, which permits the horizontal lines of the body superstructure to continue around the ends similar to the side of the car, carrying out the streamline or balanced exterior effect. A rigid bumper is projected at each end for the protection of the headlight and to serve as an anti-climber. The vestibules are tapered from body to vestibule corner posts, adding to the balanced appearance. The tapering also reduces the projection of the doors when opened.

TABLE I—DIMENSIONS COMMON TO ALL THE UNITS

Height, floor to top of roof	7 ft. 6 in.
Height, floor to underside of ceiling	7 ft. 1¼ in.
Height, floor to window sill	2 ft. 8 in.
Height, side window opening	2 ft. 5¼ in.
Height of raised side window above window sill	1 ft. 1⅞ in.
Width over sides at belt rail	8 ft. 4 in.
Length of cross seats	2 ft. 11 in.
Width of aisle at cross seats	1 ft. 11 in.
Center to center of side posts	3 ft. 5 in.
Center to center of cross seats	2 ft. 7 in.

The floor is on the same horizontal plane from end to end of car, with no offsets or steps inside the car. The double-truck car has a 3-in. compound ramp from the edge of the step to the main car floor at the bolster. The floor proper can be of wood, covered with linoleum or rubber, or of wood, chanarch or truss plate, covered with Flexolith or Masticote. On account of wheel wash the wood covered with Flexolith or Masticote seems the most desirable.



The four-wheel city car of the Brill standardized group uses a single truck but a radial motion is allowed each wheel and axle assembly by the long links at the journal boxes

Steps are of the stationary well type, with outward folding doors. On the four-wheel cars, the first step is $14\frac{11}{16}$ in. from the rail and the second step $13\frac{5}{16}$ in. high, making the top of the main car body floor 2 ft. 4 in. from the rail. On the eight-wheel or pivotal truck cars, the first step is 15 in. from the rail, and the second step 14 in. high. Inside the car there is a 3-in. compound ramp. This design of step eliminates the folding step and operating mechanism, thus reducing maintenance cost, first cost and noise.

Trolley bases are attached to running boards by cleats, insulated with rubber-covered bushings from the roof. The cleats are attached on the sides offset from the center, thus dissipating part of the trolley noise.

Light Material for Interior Trim

Side lining or wainscoting, and headlinings are of plywood composition or compressed rubber. All moldings are of metal. The interiors are painted instead of having a natural wood finish. The windows have metal frames and may be either stationary or designed to raise. The seats can be upholstered in rattan, leather or imitation leather or plush. Folding seats are provided for use in all idle doorways, thus increasing the available seating capacity. They also protect the step wells. The operator's seat is a reversible bucket seat, adjustable for height.

Illuminated roller signs are located directly over the middle vestibule windows, in the letter panel, with large letters and numerals. Bullseyes or tail lights are provided each side thereof to indicate whether a car is going or coming.

The door-operating mechanism can be of the pneumatic or electro-pneumatic type. Engines are placed overhead in cabinets over the doorways. Selective operation of the doors from the motorman's position is possible. Treadles at the remote exit doors are considered desirable, for they make possible a circulating load.

The tray type of lifeguard is used. Sand hoppers of liberal capacity, and operated by air, are placed



The appearance of this double-end, eight-wheel city type car is typical of all the units of the standardized line

inside the car to keep the sand dry. The old foot gong has been eliminated and the hand-operated pneumatic horn substituted for it.

The fare collection device is installed in a position convenient to the operator and entering passengers to speed up loading and to reduce car standing time. Some thought is being given to the use of registering turnstiles on cars to relieve the operator of a portion of his fare collection duties. Enameled horizontal hand poles or the fixed type of steel car hand grips are provided over the longitudinal seats, while grab handles are attached to the backs of the cross seats. Pipe stanchions are considered necessary in doorways to serve as grab handles. They can be of aluminum or of porcelain enameled pipe with aluminum alloy sockets.

Electric cross-seat heaters are of the double-unit type, with thermostat control, as prescribed by heater manufacturers. Some consideration is being given to rheostat heating. The arch roof requires a number of low-level side roof exhaust ventilators with grills in the headlining. In addition, a direct flow of fresh air is obtained from ventilators behind the sun visors at each end of the car.

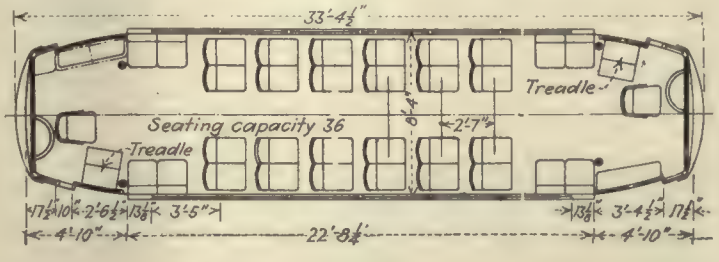
The "bath tub" type of draw curtain is provided behind the operator. The deep letter panel and low headroom features, however, do not warrant the use of side curtains.

The lights in the body are of the side, small dome fixture type, located near the center line of the cross-seats, so that seated passengers will get the full benefit of interior illumination. All the body lamps can be placed in one circuit by using a short-circuiting type of lamp. However, separate circuits are more desirable for the headlight and the sign, door and platform lights. Stop lights are considered necessary now on street cars and can be installed. An incandescent dash headlight is available with fresnel lens, which also illuminates the dasher, thus eliminating the expensive bank of lamps under the hood at the vestibule belt.

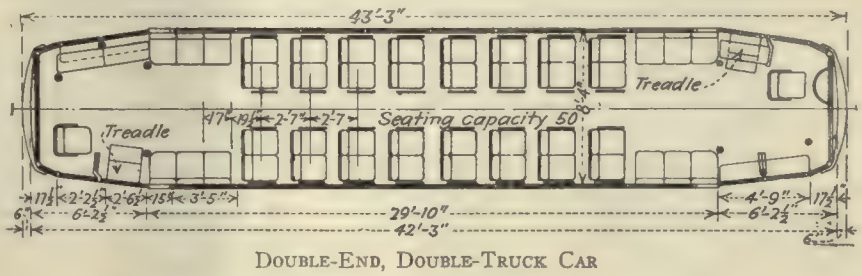
Aluminum alloys can be used in the cars to any extent desired. The company plans to build either all-steel cars, or cars with aluminum bodies and steel trucks, or cars with bodies and trucks of aluminum. The use of aluminum involves a greater first cost, but the decrease in weight effects lower operating costs.

Trucks for the Four-Wheel Cars

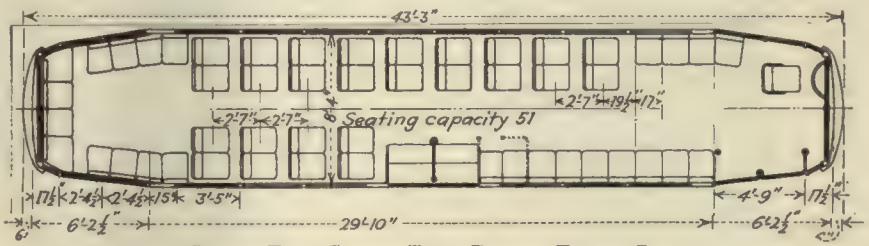
For car bodies up to about 34 ft. in length the four-wheel truck is practicable. The seating capacity and maximum load, however, are limited, as are the platform space and overhang. Also, the load per wheel is increased, the safety at high rates of speed is risked on irregular track and the riding comfort of the pivotal



Double-End, Four-Wheel Motor Car

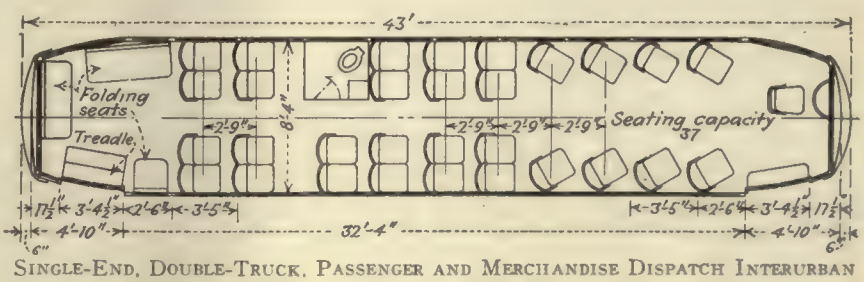


Double-End, Double-Truck Car

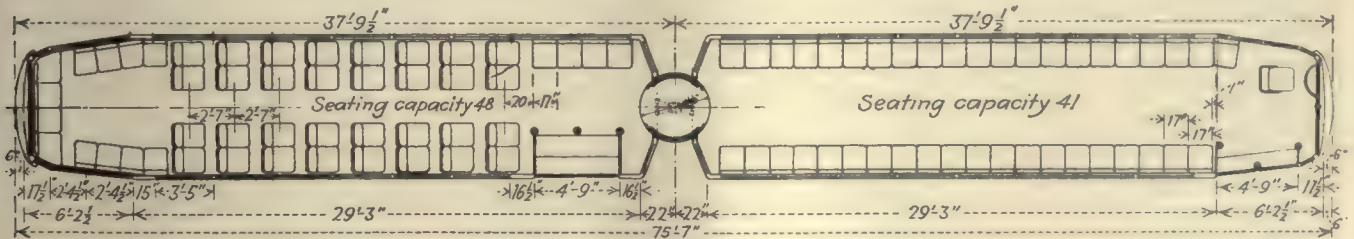


Single-End, Center-Exit, Double-Truck Car

The uniformity of design of the Brill models is shown by this group of illustrations, showing the floor plans of a four-wheel car; a double-truck, double-end car; a double-truck, single-end, center exit car; an interurban, and an articulated unit. Although a few general dimensions vary, many of them are common to all units



Single-End, Double-Truck, Passenger and Merchandise Dispatch Interurban



Single-End, Center-Exit, Articulated Car

TABLE II—PRINCIPAL CHARACTERISTICS OF THE BRILL STANDARDIZED LINE OF CARS

Type of Car	Length Overall in Ft. and In.	Seating Capacity	Maximum Capacity	Number and Horsepower of Motors
Four-wheel, single-end	33—4½	42	100	2–50
Four-wheel, double-end	33—4½	36	100	2–50
Eight-wheel, single-end	43—3	53	160	4–25
Eight-wheel, single-end	43—3	53	160	4–35
Eight-wheel, double end	43—3	50	160	4–25
Eight-wheel, double-end	43—3	50	160	4–35
Eight-wheel, single-end, center-exit	43—3	51	160	4–25
Eight-wheel, single-end, center-exit	43—3	51	160	4–35
Twelve-wheel, duplex articulated	75—7	89	300	6–35
Eight-wheel, interurban, passenger car	43—0	39	100	4–50
Eight-wheel, interurban, passenger and merchandise dispatch car	43—0	37	100	4–50

eight-wheel car cannot be obtained. On the four-wheel car of the standardized line regular 28-in. solid wheels are used, pressed on and fixed to solid non-parallel axles. The wheelbase is 12 ft.

The radial motion allowed each wheel and axle assembly comes from long links at the journal boxes, which permit, under stress of centrifugal force, a movement in rounding curves. At the same time, the double bolt arrangement of these links does not allow this radial motion to be continuous. These double bolts exert a powerful influence, tending to return the wheel and axle assemblies to their normal position. Thus the wheel and axle assemblies are held to their normal position, in line with the car body, until there is exerted upon them some strong force, such as might be set up by the car body passing over bad irregularities or a curve in the track. The links then allow sufficient radial movement to guarantee smooth and comfortable riding. The bolts, however, oppose any continuous oscillation which might have a tendency to be set up. This arrangement allows the car to coast freely and eliminates the galloping motion.

Unit Assembly of Running Gear

The frame is of the composite type with rigid crossings to receive the motors, transmission and brakes. The entire running gear constitutes a unit assembly, designed for accessibility, convenient removal and minimum maintenance. The car body is suspended on four cantilever springs with a 19-ft. spring base. The far ends of these springs are shackled to the car underframe. The journals may be of the anti-friction bearing type, or of the plain wedge key type.

Two 50-hp. high-speed automotive-type motors, with four-point suspension, are mounted amidship of the truck, supported by crossings to the truck side frames. The first gear reduction, 3.25 to 1, is of the single spur type, directly connected to each motor and running in oil. A low-speed propeller shaft from the gear reduction unit turns a secondary bevel gear transmission at the center of each axle. The secondary transmission has a gear ratio of 2.5 to 1, giving a total reduction of 8.125 to 1. The bevel transmission also runs in oil. Its housing serves as a pivotal yoke giving radial action to the wheel and axle assemblies.

For braking, two external contracting air-actuated clasp drum brakes are employed on each axle, supported by the bevel gear housing. The total brake pressure of the drum brakes is equal to 100 per cent of the loaded car. In addition, there is one magnetic track brake on each side of the truck, supported by the truck side frame.

Conventional Trucks for Eight-Wheel Cars

Trucks for the eight or twelve-wheel cars are of the conventional four-wheel pivotal type. They employ 26-in. diameter solid wheels, pressed on cylindrical seats on heat-treated solid parallel axles of dimensions as recommended by the American Electric Railway Engineering Association.

Journals can be either of the anti-friction type or plain type. The swinging bolsters have guides which control the movement of the bolster. They also insure easy riding and dissipate side lash which is destructive to car bodies. Combination coil and plate springs are suspended from parallel swing links. The supports for the motors with single reduction drive are designed to make the electric equipment readily accessible and removable, and to insure perfect alignment. The shoe tread brakes have improved half ball hangers and automatic mechanical slack adjusters. All wearing parts are of hardened steel.

The conventional axle-borne type motors with single reduction are recommended for the pivotal eight-wheel or double-truck street cars. For the four-wheel cars, however, the high-speed motor is considered best. This type of motor with its necessary high reduction transmission adapts itself more readily to the running gear, which accounts for its selection. On certain of the models, either 25-hp. or 35-hp. motors can be mounted. These are the eight-wheel, single or double-end and center exit cars.

Foot operated electric control and air brakes are recommended for the new cars. The doors, signals and sanders can be operated with the hands, but the control and brakes should be foot operated. A space is provided in the lower left-hand corner of the vestibule for the pedals, and a cabinet is installed for the reverser and other operating switches. The hand brake should be of the high ratio gear or staffless type, with mechanical connections for braking of all wheels.

TABLE III—WEIGHTS OF ALL MODELS INCLUDED IN THE UNIFORMLY DESIGNED LINE OF BRILL CARS

Type of Car	Cars With Steel Bodies and Steel Trucks		Cars with Aluminum Bodies and Steel Trucks			Cars with Aluminum Bodies and Aluminum Trucks		
	Weight Complete	Weight per Seated Passenger	Weight Complete	Weight per Seated Passenger	Per Cent Saving by Using Aluminum	Weight Complete	Weight per Seated Passenger	Per Cent Saving by Using Aluminum
Four-wheel, single-end	26,195	622	21,870	518	16.5	19,645	469	25.0
Four-wheel, double-end	27,435	762	22,985	637	16.2	20,760	575	24.3
Eight-wheel, single-end, four 25-hp motors	29,865	563	24,695	466	17.3	22,565	425	24.4
Eight-wheel, single-end, four 35-hp motors	32,955	621	27,785	524	15.7	25,685	485	22.1
Eight-wheel, double-end, four 25-hp. motors	31,550	631	25,780	516	18.3	23,780	476	24.6
Eight-wheel, double-end, four 35-hp. motors	34,645	693	28,875	577	16.7	26,875	537	22.4
Eight-wheel, single-end, center-exit, four 25-hp. motors	30,765	603	25,455	499	17.3	23,325	457	24.2
Eight-wheel, single-end, center-exit, four 35-hp. motors	33,855	663	28,545	559	15.7	26,445	518	21.9
Twelve-wheel, duplex articulated	60,905	685	50,800	571	16.6	46,800	526	23.2
Eight-wheel, interurban, passenger	37,570	962	32,055	821	14.7	30,055	770	20.0
Eight-wheel, interurban, passenger and merchandise dispatch	37,470	1,011	31,955	863	14.7	29,955	809	20.0

Tampa Reduces Accidents

58 Per Cent

Persistent and successful effort toward greater safety brings recognition in Anthony N. Brady contest



While angular parking was permitted on the main business streets of Tampa, street conditions were very congested. This situation has now passed with the adoption of parallel parking

WITH the notable record of accidents reduced this year by 58.6 per cent, or more than one-half, the Tampa Electric Company won the Brady Award for the best 1927 safety record, given to companies operating during the year between 1,000,000 and 5,000,000 car and bus-miles. This was accomplished in spite of the fact that the 1926 figures showed a material reduction from those of 1925. The miles operated per accident in 1927 were 3,480, as compared with 1,662 in 1926. The nearest approach in the history of the company to the 1927 figure was in 1922, when 2,775 miles per accident were operated, but in 1922 the city was much smaller and there were less than a third as many automobiles in the territory.

The Tampa Electric Company furnishes co-ordinated railway and bus service in Tampa and contiguous territories. It owns 55.87 miles of equivalent single track and operates 12.02 miles of bus routes. The rolling stock consists of 139 passenger cars, 14 service cars and 30 city buses. It provides transportation to a population of 146,200. The gross earnings for 1927 were $982,899.

While the major part of the company's safety work has been within its own organization, it has received hearty co-operation from various city organizations, such as city officials, Police Department, motor clubs, parent-teachers' association, and school officials, in bringing about the reduction of accidents as indicated by the figures already given.

The Police Department was one of the earliest organizations to co-operate with the company in safety measures, but during 1925 the traffic situation became so serious the City Commission decided a traffic advisory committee, composed of various business organizations throughout the city, was necessary to help solve the numerous traffic problems with which the city was confronted. The manager of the Tampa Electric Company was appointed chairman of this committee, and another member of the organization was appointed secretary. Through the co-ordinated efforts of the interests represented on this committee with the company's transportation problem, the Police Department and city officials, a number of changes have been effected in traffic regulations for the improvement of safety.

One of the most important of these was the change



All track curves are marked with a white line at a sufficient distance from the rail to allow clearance for the overhang of any car

from angular to parallel parking on Tampa's main business streets. Two illustrations show the effect. One illustrates traffic conditions on one of the business streets on which car lines operate, taken shortly before the change from angular to parallel parking. The crowded and dangerous conditions prevailing at that time can readily be understood. The other view, while showing incidentally parallel parking, also illustrates one of the safety landings, of which a number have been built, all at the company's expense. As will be seen, the front end of this landing is protected by a blinker light. At present, parking has been prohibited on one side of narrow streets on which single track car lines operate, to allow passage of street cars and automobiles going the other direction.

A great many other safety precautions have been introduced. Reference will be made briefly to several of them.

A number of through thoroughfares have been established and have been marked with "stop" signs at each intersection.

To insure the safety of school children using street cars and buses, the majority of them are carried on special cars and buses, and when one-man cars are used, an extra man is stationed on the rear platform to insure safety. Whenever school children become unruly and by their carelessness endanger themselves and others, their names are secured, and a representative of the company calls on either the school official or the parent and warns him of the danger.

A car has been painted white with various safety slogans in black and red on the sides and ends, and during 1927 was operated as a regular car over each division for a day at a time until the entire system had been covered. Then it covered the system again for one day on each



These raised safety zones, with a blinker light at one end, have helped to reduce accidents and make boarding and alighting much more comfortable

line on a different schedule. Passengers riding on this car did so as the company's guests, as no fares were charged. They were only asked to read the pamphlets given out by the operator.

The company co-operated with the daily papers in supplying information with reference to the progress made in safety work. For a short time the daily papers also ran pictures of trainmen with outstanding safety records.

The superintendent of roadway of the company devised a new type of switch, now manufactured by a prominent special work manufacturer, which permits safer car movement, both in and out of switches, and at a higher speed.

Bonus System Installed

One of the most important developments, however, in the opinion of the company, was the establishment of an accident prevention bonus system, beginning Oct. 1, 1926. A feature of it is that it not only creates interest in safety work in the individual but also provides for collective interest in team work.

Briefly, the company set up a fund of $400 as a base amount for each contest, which continued for a period of four months. For every accident less than the total number during the same period of the previous year, $10 was added to the fund. For each day on which there was no accident, $25 was added to the fund. If there were more accidents during any contest period than there were during the corresponding period of the previous year, $10 was deducted from the fund for each accident over the record of the previous year. To prevent unreported accidents a penalty was imposed on the guilty man by charging him with three accidents and requiring him to serve a period at the bottom of the extra list. For each unreported accident, also, $30 was deducted from the fund. The rules require a report of every accident, or unusual incident, however slight, either on or near the car or bus.

Trainmen and bus operators were grouped into two divisions. One consists of car operators, bus operators and motormen; the second division consists of conductors only. To participate in the contest it is necessary for a man to work as many as 800 hours during the four months' contest period.

How the Bonus Fund Is Divided

The division of the bonus fund is as follows:

Car operators, bus operators and motormen who were involved in no accidents of any nature during the contest period, twelve shares; those who have no chargeable accidents during the period, ten shares; those having one chargeable accident during the contest period, five shares; those having two chargeable accidents, three shares.

Conductors having no accidents of any nature during the contest period, seven shares; those having no chargeable accidents during the contest period, five shares; those having only one chargeable accident during the contest period, three shares.

A committee composed of two trainmen, one bus operator, the claim agent and the master mechanic, decides any questions that may arise as to the accident classification.

During 1927, 83 per cent of the trainmen and bus operators shared in the bonus plan; 7 per cent were disqualified for not having worked enough hours, and only 10 per cent did not participate in the fund because of having three or more chargeable accidents during the period. The total cost of this bonus fund for 1927 was $5,250. Over the year's period the men have received bonuses from $14.10 for men having two chargeable accidents to $50.35 for men having a perfect record.

Beginning with December, 1927, a contest was also arranged among the various lines of the system. This plan has as its reward a monthly prize of $5 for each man on the car or bus line which operates the most miles per accident. The extra men of the company are divided into groups and the members of the winning group are likewise given a prize of $5 each. This also has proved very effective.

During 1926 and 1927, the company's labor turnover, due to the so-called boom condition in Florida, was very great, and during 1927 only about 25 per cent of the trainmen and bus operators had been in service for more than two years. In view of this fact, the results obtained in accident prevention work were all the more remarkable.

Extensive Improvements Made on Rochester Subway

Ten shelters have been erected, one of the stations enlarged, all of the stations repainted and part of the right-of-way fenced in to prevent trespassing



The new waiting shelter and platform constructed at Driving Park Avenue Loop

TO ADD to the safety and comfort of passengers, and to insure parts of the system against too rapid depreciation, the city of Rochester has made a number of improvements to its subway system, operated by the New York State Railways. The work consisted of waterproofing the joints in the superstructure between Exchange and Oak Streets to prevent leakage of surface water, the building of ten shelters in subway stations, the construction of platforms and waiting rooms at two loop stations, the repainting of all subway stations, the erection of 3,500 ft. of fencing to prevent trespassing and the enlarging of the Times Square station.

The ten shelters were added in the subway stations between Driving Park Avenue and Rowland Loop. They were built at the foot of the stairway leading from the street wherever possible. Last winter it was found



Shelters have been erected at ten stations along the Rochester subway lines. Wherever possible they were built at the foot of the stairway, as was this one at Lexington Avenue

that water drained from the roof of the stairway covers to the station platform at the foot of the stairs and caused a sheet of ice to form, so that passengers hurrying down the steps often lost their footing and suffered painful falls.

The shelters are built of cinder block and are stuccoed. They are of a design to agree with the stairway covers and, on an average, are about 12 to 17 ft. long. They are roofed and have benches inside, but are not heated, with the exception of the Times Square station. The contract for this work involved an expenditure of $11,000. There are fourteen stations along the subway, including the station at Driving Park Avenue Loop and at Rowland's Loop.

Two Stations Completed

A new waiting room and platform also has been completed at the Driving Park Avenue Loop, as well as a shelter and platform at Rowland's. At Rowland's a sidewalk and steps were built to connect with the street railway terminus. Under the same contract additional retaining walls were built where the dirt banks had shown a tendency to wash out, chiefly in the Rowland's section. The figure for this work was $9,500.

Under another contract the Times Square station was enlarged to give double the former waiting space. A small concession for the sale of papers and the checking of parcels is housed in it. The extension covers the exit from the stairway leading from Exchange Street. Under the same contract a small oil house was built at the Howell Street Loop for the servicing of Rochester, Lockport & Buffalo cars. A curb was erected on top of the wall between Court and Griffiths Streets to protect the subway below from material falling from the wall. The cost of all this work was approximately $10,000.

Another important part of the improvement program was the repainting of all subway stations. This work was done at a cost of $1,395.

A contract was let for the erection of 3,500 ft. of wire mesh fencing along the right-of-way. This is a protective measure designed for the safety of persons walking along the subway, as well as a means of preventing trespassing. Most of this is being erected in the eastern section. The work will cost $3,400. It is not intended that the fence shall delineate the subway right-of-way.

The city itself, through its department of public works, is waterproofing the joints in the superstructure between Exchange and Oak Streets to prevent the leakage of surface water. The first step in this work is to cut through the asphalt around the kiosks to expose the joints in the concrete underneath. Waterproof material is then laid over the joints and small drainage pipes are sunk through the concrete, so that moisture will drain through into the subway without damaging its concrete and steel deck.

When the work around the kiosks is completed, each concrete joint between Exchange Street and Oak Street is to be waterproofed. This will necessitate removing a strip of asphalt surfacing, about 4 ft. wide at each joint, and cutting through the layer of low-grade concrete under the asphalt. Otherwise, water would seep through the joint of the concrete, slowly disintegrating the material and rusting the steel framework underneath.

As the deck over the Aqueduct is already waterproofed, no additional work will be required there; but the city has completed improvements to the sidewalks on the cantilever construction over the Aqueduct and also along South Avenue, so that not only are the sidewalks now in good condition, but the arched steel underneath is guarded against moisture and rust. The waterproofing work was continued during the fall, as long as weather permitted, and is to be continued in the spring.

Credit Union Formed in Gary

THE Gary Railways Employees Credit Union was incorporated on Jan. 2. Stock in the union is being sold at $5 per share. The project aims to aid employees in saving, to make loans to members at reasonable rates with or without security, and to invest any surplus in a manner required by law. The capital stock consists of 2,000 shares. Any employee of the Gary Railways, Gary, Ind., is eligible for membership and may purchase one or more shares of stock in the union, either for cash or on a time-payment plan.

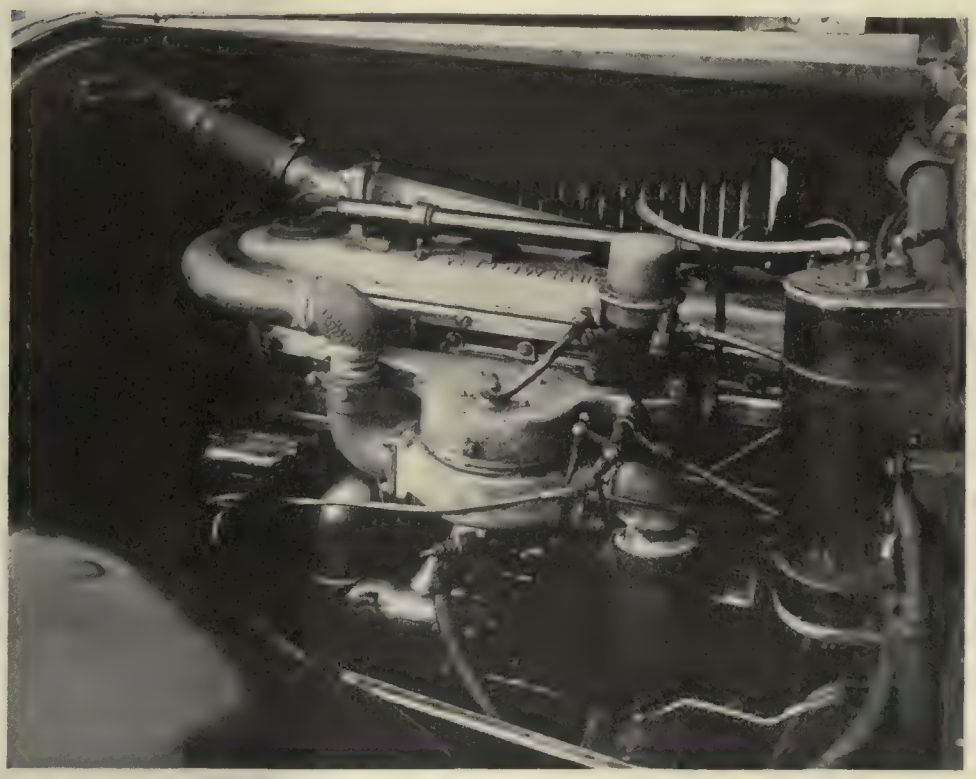
P. R. T. To Use
Fuel Oil For Buses

Apparatus has been developed making it possible to use 38-42 oil, Baumé, with a difference in fuel cost of 29 per cent. Equipment described before the Philadelphia Engineers' Club

By J. A. Queeney
Vice-President Mitten Management, Inc., Philadelphia, Pa.

DURING the present year the Philadelphia Rapid Transit Company will equip all of its buses with a device to permit the use of low-grade fuel oil in the engines. Experiments have been made on the device over a period of two years, and at the present time twenty buses are operating successfully with the fuel oil. The practicability has been so demonstrated that the company will go ahead with the equipping of all its 570 city and intercity buses.

The fuel now being used is a 38-42 oil, Baumé scale. The performance of the engine with this fuel compares very favorably with the performance secured with gasoline. Idling speed, acceleration and power, all essentials to good operation, are obtained with this device with a fixed carburetor setting.



As the Godward gas generator appears when adapted for fuel oil consumption and fully installed on an engine

The amount of fuel necessary to generate 1 kw.-hr. is 5½ per cent less than the amount of gasoline needed, using the same carburetor setting. The saving in the cost of fuel by burning oil instead of gasoline amounts to approximately 29 per cent. Since there are practically 85,000 motor buses in operation in the United States at the present time, the possible saving in the cost of fuel represents more than $50,000,000 per year.

Although the engine requires added equipment to burn the fuel oil, either oil or gasoline can be used when it is installed. If a bus using fuel oil travels away from the point of supply and runs out, the tank may be filled with gasoline and without any adjustment the bus will proceed, with no perceptible change in the performance of the vehicle.

The buses using fuel oil are on the same maintenance schedule as those using gasoline. One of the buses has been operated more than 250,000 miles and has been closely observed to see if the new fuel would have any effect on the engine to require additional maintenance. Nothing could be found to indicate any additional wear or any change whatsoever in the condition of the engine.

When fuel oil was first used a little trouble was experienced in the exhaust smoke, particularly when the engine was idling. This trouble was remedied by the



Bottom view of the main aluminum chamber. The wet mixture from the carburetor enters through the hole and is vaporized within the chamber by the heat from the exhaust

simple expedient of removing the throttle valve from the conventional location in the carburetor below the gas generator to a point where the mixture enters the intake manifold.

The device, manufactured by the Godward Gas Generator, Inc., consists of an aluminum pot in which are set a number of stationary thin curved plates, radiating from a central core. The lower edges of the plates are in contact with the aluminum pot, which is heated by the exhaust of the engine. The fuel is drawn from a standard carburetor through the inside of the pot over the surface of the warm plates, and is converted into a dry gas. It then passes through the intake manifold into the cylinder for burning. The deflector plates that are heated have a total surface of 2,000 sq.in., so that complete conversion to a hot gas is assured.

The device as designed for the use of fuel oil has incorporated in it an electrical heating unit which is used during the starting period only. By means of this unit the temperature of the fuel is raised sufficiently to start the engine. The unit receives its energy from the storage battery and consumes 80 amp. at 12 volts for about one minute, the time required for starting the engine under present conditions, which is no greater than that required to start with gasoline.

In addition to the Godward device a special intake manifold is used. The new manifold has no sharp bends, pockets or hot spots, and it has a much greater cross-sectional area and consequently less restriction than the conventional manifold. A reduction in the intake manifold velocity is permissible because of the dry gas produced in the gas generator. This construction also allows an increase in the quantity of mixture entering the cylinder, thus increasing the volumetric efficiency of the engine. No other special equipment is required. The same carburetor as supplied by the manufacturer with the engine is used.

Experiments Conducted for Two Years

The problem of operating gas engines successfully with fuel oil without the use of gasoline for starting or without complicated mechanism has been considered by many engineers as impossible of solution and by others as extremely doubtful. The apparent advantages, however, seemed to be too great not to warrant a trial. Accordingly, the company accepted an inventor's device about two years ago and installed it on one of the taxicabs for trial. After numerous tests it was found that, while it was possible to operate on fuel oil by starting the engine on gasoline, the general performance was so unsatisfactory that it could not be given serious consideration. For example, when good idling performance was obtained, it would be impossible to secure sufficient power output for satisfactory operation at the usual speed, and when it was possible to obtain sufficient power output, the engine would not operate satisfactorily at the lower speeds. After many months of effort it was decided that the experimentation was not being conducted along the proper lines.

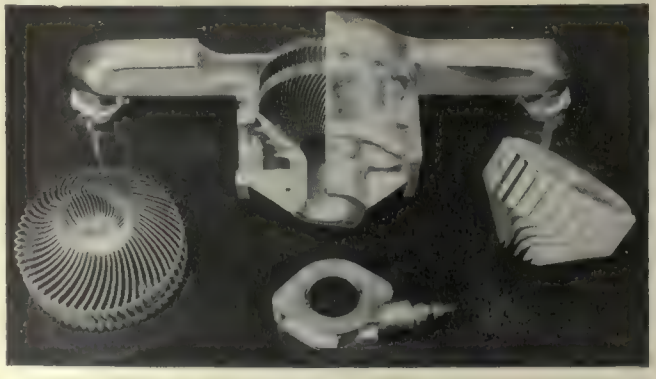
In January, 1927, the Godward gas generator was brought to our attention as a device for saving gasoline and increasing the output of the engine. The device was given a trial and found to be satisfactory for saving gasoline. Observations made through a glass window, inserted in the intake manifold, showed that with gasoline and a standard carburetor and manifold wet gasoline was carried into the engine's cylinder under all running conditions. With the Godward gas generator installed, however, no evidence of a wet mixture could be found in the manifold.

At the present time twenty gas-electric buses are equipped with the device and are operating in intercity service where heavy grades are encountered. Since the installation of the device these vehicles have made more than 300,000 miles. The generator has enabled us to increase the horsepower output of the engines of these particular buses 15 per cent, resulting in a decided improvement in the performance of the vehicles, especially on hills. The additional output has enabled us to increase the scheduled speed of intercity lines without any increase in gasoline consumption in pounds per brake-horsepower per hour.

In addition to the twenty gas-electric buses that are operated with gasoline, we also have five taxicabs of the standard mechanical-driven type that are equipped with the Godward gas generator. These taxicabs have four-cylinder Yellow Knight engines. The installation of the generator not only has improved the performance of the vehicles decidedly, but also has resulted in a reduction of gasoline consumption of 9 per cent.

During this development we concluded that the gas generator could be modified and used as a basis of the equipment necessary to operate on fuel oil successfully. After numerous experiments and tests the present equipment was developed and we now have twenty buses that have operated more than 250,000 miles on fuel oil. Six of these are equipped with an improved device, including all modifications and changes made to date.

In addition to the apparatus used for the burning of



Cutaway view of the Godward device showing how the stationary deflector, consisting of several thin curved plates, is mounted inside. The electric heating unit for starting and two types of deflectors also are shown

fuel oil, we also have developed apparatus for analyzing the exhaust. This equipment serves two purposes—first, of checking the engine's efficiency, as any unburned gas that is present in the exhaust represents a definite power loss, and second, of analyzing the exhaust to reduce to a minimum the poisonous carbon monoxide gas.

It is not unusual to hear occasionally of the death of some unfortunate person due to carbon monoxide gas. No doubt many people believe that because of the size of the motor bus it is a great offender by filling the air with this poisonous gas. Recognizing the importance of reducing to a minimum the carbon monoxide gas we conducted many experiments and finally developed the exhaust analyzing equipment, now installed in the automotive research laboratory of the Hunting Park bus shops.

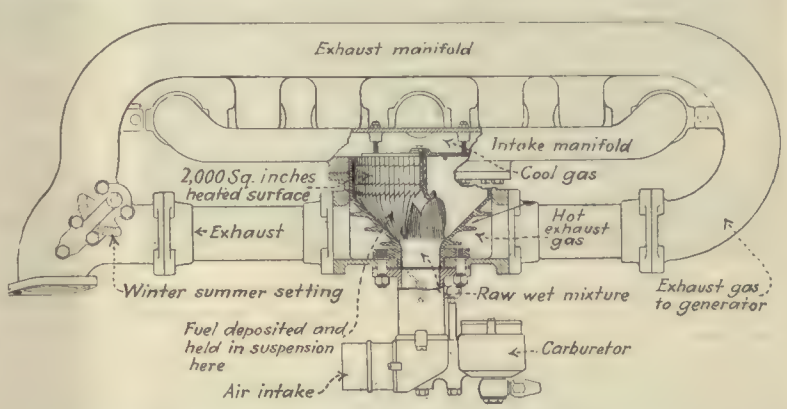
Our studies made with this equipment prove conclusively that by maintaining the engine in good mechanical condition and by proper adjustment of the carburetor the exhaust gas can be controlled. A survey by engineers of the United States Bureau of Mines disclosed that "the percentage of carbon monoxide gas with the majority of cars is between 5 and 9 per cent." With this apparatus we have no difficulty in decreasing the carbon monoxide content from the exhaust of our buses to 3 per cent or less. We have obtained as low as 1 per cent under both idling and operating conditions.

Gasoline as sold at any filling station contains approximately 85 per cent carbon and 15 per cent hydrogen. During the burning process inside the engine the gasoline is broken up into various gases, the most common of which are carbon monoxide, carbon dioxide, hydrogen, methane and gasoline vapor. Of this group the two most important are carbon monoxide and carbon dioxide. If compression were perfect all the carbon monoxide would be burned to carbon dioxide, a harmless gas, but since this condition is never attained in the modern automobile, we have to deal with carbon monoxide, which is poisonous.

From the foregoing it is evident that an instrument which accurately measures the carbon dioxide in the exhaust gas is valuable as giving an indication of the performance of the engine. Numerous tests have shown that a motor in good condition produces between 10 and 12 per cent carbon dioxide, and if, therefore, the engine under consideration shows a much lower figure, it is evident that either the carburetor is poorly adjusted, the ignition is faulty, or the compression is low due to leaky valves or some other cause.

Apparatus Measures Unburned Combustibles

It is not practical to measure the carbon dioxide directly with an electrical indicator, so an instrument has been developed which measures the carbon monoxide, hydrogen and other combustibles present in the exhaust. This instrument records the incompleteness of combustion. The apparatus consists of two small cylinders, each containing a wire of special composition. These wires are connected to a battery and to a meter through suitable resistances. The meter is simply a moving coil galvanometer. When the switch connecting the batteries with the wires in the two cylinders is closed the meter will register zero, until both cylinders are filled with air and the entire electrical system is balanced. In operating a connection is made between the exhaust manifold of the engine and the inlet pipe of the testing apparatus. As the exhaust gas enters one of the cylinders it draws a small quantity of air through a nozzle. The resulting mixture, being combustible, is ignited when it comes in contact with the heated wire. The burning of the gas increases the temperature of the wire, the rise being effected by the percentage of the combustibles contained in the gas. The change of resistance of the wire caused by the increases in temperature disturbs the electrical balance of the two circuits, arranged as a Wheatstone bridge, and causes a deflection of the galvanometer. The deflection varies in accordance with the percentage of combustibles present in the exhaust, and by referring the galvanometer reading to a chart the percentage of carbon monoxide, hydrogen and other combustibles can be determined. Definite standards are established, and if the meter reading is above or below these standards the operator adjusts the carburetor or ignition, or makes other changes until the meter reading becomes normal.



A total heated surface of 2,000 sq.in. within the chamber vaporizes the mixture of fuel oil and air before it enters the intake manifold. The exhaust manifold is designed so that full exhaust or none can be passed through the generator

To confirm their own tests the Philadelphia Rapid Transit Company engaged the services of Professors Autenreith and Baum of the College of the City of New York to test the device developed for burning fuel oil and the apparatus for the analysis and control of the exhaust. They tested buses using standard equipment and others using the vaporizing device for comparing results, and then conducted a series of tests with different fuels and types of equipment on a single unit. The following is their report:

On Dec. 15, 1928, the writers visited your Hunting Park Avenue garage and noted the operation of bus No. 57, which was equipped with a Godward gas generator and manifold and which burned fuel oil. The engine was started on this fuel and ran very well with ample power and acceleration for all conditions of traffic and grades encountered. The operation of the engine could not be distinguished from that of similar buses on the street using gasoline.

We tested this engine on a water barrel and the generator delivered 44.3 kw., substantially the same output as obtained from the engine and generator of bus No. 36, the latter using standard equipment and gasoline and delivering 43.8 kw. The carburetor air valve of bus No. 36 was in the normal position for winter running, and the power output of both units was measured at wide open throttles, at 1,600 r.p.m., this being the average operating speed.

We felt that a comparison of the performance of two different power units running on different equipment would not furnish data from which it would be possible to draw dependable conclusions, so we suggested that the performance of a single unit be determined with different fuels and types of equipment. Accordingly, another series of tests were conducted. The bus



This laboratory equipment for analyzing the exhaust permits the checking of engine efficiency, as any unburned combustibles represent a definite power loss

used for these tests was equipped as it came from the factory with a Zenith carburetor, which had a No. 29 Venturi, No. 24 main jet, No. 22 compensating jet and No. 55 idling jet. The power unit of this bus delivered as much as 49.4 kw. at 1,600 r.p.m. on gasoline. The exhaust gas analyses showed a carbon monoxide content as low as 3.1 per cent at 1,600 r.p.m. and a carbon monoxide content as low as 7.3 per cent on idling at 380 r.p.m. The carbon dioxide contents were 12.2 per cent and 6.4 per cent, and the oxygen 0.5 per cent and 4.4 per cent, at the higher and lower speeds, respectively. We consider this an unusually good performance as far as the carbon monoxide content is concerned, particularly under full power.

The standard manifolds were then removed and replaced by the Godward equipment. The same carburetor was used and the unit operated under the same conditions. The power output was found to be 3.85 per cent less with the same carburetor setting and standard manifold because of the damping effect of the new equipment on the carburetor jets. The exhaust gas analyses, however, showed carbon monoxide contents of 1.4 per cent and 7.6 per cent, and carbon dioxide contents of 13.6 per cent and 7 per cent, at the 1,600 r.p.m. and idling speeds, respectively.

It was then decided to readjust the carburetor for equal power and best results as to carbon monoxide content with the gas generator equipment. Outputs of 49.4 kw. and 50 kw. were obtained on two successive runs with the idling jet set at No. 40. Reducing this jet to No. 40, the smallest obtainable, resulted in a carbon monoxide content of 6.4 per cent when idling. This size jet is considered entirely too small for this size engine, and yet it was found necessary to enlarge the holes in the idling needle valve seat to a $\frac{1}{8}$-in. diameter to obtain the idling mixture producing the minimum carbon monoxide content.

After these changes were completed the same power was obtained and the gas analyses of the exhaust showed for two successive runs the averages of 13.8 per cent carbon dioxide, 0.4 per cent oxygen and 1.05 per cent carbon monoxide. At 380 r.p.m., the exhaust analyzed 10.2 per cent carbon dioxide, 6 per cent oxygen and 0.25 per cent carbon monoxide.

The engine was then operated on fuel oil with a specific gravity of 8.014, or 42 Baumé. With this fuel the power unit delivered as much as 47.5 kw. at 1,600 r.p.m. with the carburetor settings of Venturi No. 33, main jet No. 29, compensating jet No. 28, idling jet No. 40, and the idling needle valve seat enlarged to the diameter of $\frac{1}{8}$ in. With these settings the exhaust gas showed at wide open throttle a content of 12.6 per cent carbon dioxide, 0.25 per cent oxygen and 2.45 per cent carbon monoxide. At idling speed the analyses showed 9.7 per cent carbon dioxide, 7 per cent oxygen and 0.0 per cent carbon monoxide. With another needle valve setting the exhaust analyzed 10.4 per cent carbon dioxide, 5.6 per cent oxygen and 0.0 per cent carbon monoxide. It must not be assumed from these results that any needle valve setting will give low carbon monoxide content on idling. For instance, with one particular needle valve setting a percentage of 2.9 carbon monoxide was obtained. This, however, was the highest value obtained with fuel oil on idling.

On previous experiments with this type of engine and carburetor we have not been able to get satisfactory idling with so lean an idling mixture with the standard manifolding. From the various runs made under the different conditions described we are convinced that it is practicable to operate your buses on either gasoline or fuel oil with the gas generator equipment and standard carburetor, and secure a carbon monoxide content of the exhaust gases of less than 3 per cent under your conditions of operation.

Our tests showed that the gas generator equipment had the effect of reducing the carbon monoxide content of the exhaust gases without reducing the power. Of course, for best results with any kind of fuel the proper carburetor settings must be determined, but as far as operation on the road is concerned a change from fuel oil to gasoline without changing the carburetor setting will not be apparent to the driver.

Two Hours from South Bend to Chicago

ANOTHER milestone in the progress of the Chicago, South Shore & South Bend Railroad, since the change of management in 1925, came with the inauguration of a flat two-hour schedule for extra fast trains between the line's terminal cities of South Bend and Chicago, on Jan. 1.

For three years this railroad has been carrying on an extensive reconstruction program designed for better and faster service to the people of its territory. Scheduled time between the Chicago and South Bend terminals, set with the beginning of the new regime at two hours and a half, was cut last spring to two hours and fifteen minutes in the case of four trains. Last fall this was shortened to two hours and five minutes in the case of two trains, westbound in the morning and eastbound at night. This service was specially designed for commuters, and both trains carried dining cars for the convenience of the passengers.

With the new two-hour schedule, the same arrangement will obtain, except that the Fort Dearborn Limited, Chicago-bound morning train, leaves South Bend station at 7:05 a.m. instead of 7 a.m. At the same time the Chicago Express which formerly left Gary at 8:30 a.m. now leaves at 8:22, changing leaving times also at East Chicago, Hammond and Hegewisch.

Beginning in 1925, with the change of management, improvements and reconstruction affecting virtually every department of the railroad have been made. Nearly $8,000,000 has been invested in the property, toward giving improved service to both passengers and freight patrons.

Faith in the future of the great industrial areas, the homesites and growing cities of northern Indiana has been the principal reason for the development of the South Shore Line. Public response has so far justified this faith. Within the three years of the present management, passenger revenue has increased from $599,236 to $1,772,918. Freight revenue has increased in the same period from $189,263 to $1,129,856. Total operating revenue has grown from $858,265 to $2,971,488 for the year ended Sept. 30, 1928.



Buff brick walls, ornamental window grilles and a red tile roof give a Spanish appearance to this attractive club house at Cincinnati

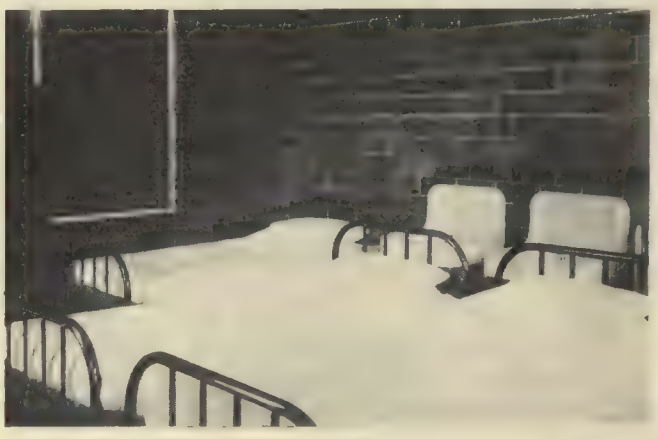
Cincinnati Railway Builds Attractive Office

ENLARGEMENT of an existing substation of the Cincinnati Street Railway to house new automatic electrical equipment made it necessary to move the Hyde Park division office from its location immediately adjacent to the carhouse. A new one-story structure, rectangular in shape with a garage projecting in the rear, was built on the front corner of the division yards at Tarpis and Erie Avenues. Buff brick walls and a red tile roof give the building a Spanish appearance.

Inside, the walls are of glazed tile with a sanitary curve where walls meet the painted and varnished cement floor, and rounded corners where wall meets wall. There are no dust-collecting corners in the whole building. In addition to a boiler room, janitor's quarters, curve-cleaners' grease room, and a garage for the emergency truck, the basement contains a white-tiled wash room equipped with two shower baths and a dressing alcove.

The club room, an office for the receiving clerks, sleeping quarters, and the private office of the division superintendent occupy most of the first floor. Smaller rooms for storing supplies, for filing lost articles, for lockers, and a shower bath, toilet and lockers for the clerks take up the remaining space.

A reinforced glass partition with windows protected with ornamental grille work separates the clerks' office from the club room. The sleeping room is outfitted with six walnut-finished Simmonds iron beds, six lockers and two wash stands.



Comfortable sleeping quarters are included in the equipment of the building at Hyde Park division headquarters



Equipment installed in this club room includes two long linoleum-topped tables, benches and glass-inclosed schedule frames and bulletin boards



The receiving clerks' office is 18 ft. square with a counter running the full length of one side of the room. Shower, toilet, and locker facilities are provided in an adjoining room

New Yorkers Discuss Methods of Bettering Public Relations

New cars and equipment, employee training, and service improvement were topics at state association's mid-winter meeting

HOW the local transportation companies can improve their relations with their patrons, the public, was the principal topic of discussion at the midwinter meeting of the New York Electric Railway Association, held at the Hotel Commodore, New York City, on Jan. 22. The sessions were attended by about 200 members and guests, with W. E. Thompson, vice-president Third Avenue Railway System, presiding. Operating practices of various properties visited during a recent trip sponsored by a Rochester, N. Y., newspaper were discussed by R. R. Hadsell, general manager Schenectady Railway. Wherever the party went they were impressed with the fact that those electric railway properties which were in the best repute with their patrons were invariably the ones that were giving particular attention to the training of their platform men in the elements of courtesy, safety and ride salesmanship. "The platform man is today the key man of the industry," said Mr. Hadsell, "and the public is quick to appreciate the little courtesies and attentions that it receives from a well-trained, neat-appearing train force."

William E. Wood, president, Virginia Electric & Power Company, told of the steps taken by his company in establishing itself in the good graces of its patrons, which had led not only to better earnings and a more hopeful outlook but, indirectly, to the winning of the Coffin Award in 1928. When he and his associates took over the management of the property in Richmond they found their principal handicap to be a heritage of ill-feeling left by an able but contentious former management. As soon as the new management made clear that it desired to play fair, that it sought nothing to which it was not justly entitled, and that it intended to meet the public more than half way in any question of service or policy, there was a change of feeling and the responsible elements in the community hastened to proffer their support. Since then there has been a gradual strengthening of the bond of interest until, at the present time, the company is receiving splendid co-operation from the residents of the communities which it serves.

The case in favor of the purchase of new rolling stock, as opposed to the rehabilitation of the old equipment was presented by George Frey, general sales manager J. G. Brill Company, Philadelphia, Pa., whose paper is presented in abstract elsewhere in this issue. He was followed by J. B. Hayes, general superintendent of transportation, Virginia Electric & Power Company, Norfolk, Va., who outlined the program carried out on his property of redesigning and rehabilitating old rolling stock to meet present-day requirements. This step, it was explained, was not taken from choice but from necessity. Although the company would have preferred buying new cars, the result had been gratifying, resulting in an actual return of 46 per cent on the cost of rebuilding. As a direct result of the program of modernization the company is able to point to slightly increased speed, a material improvement in passenger comfort, better appearance, and safer operation.

A paper on modernization of electric car equipment, prepared by A. J. Manson of the Westinghouse Electric & Manufacturing Company, was presented by Harry R. Meyer at the afternoon session. Recent improvements made in motor and control design for electric cars were discussed. Whereas once manufacturers had a standard type of motor, now in order to meet the demands for higher schedule speeds, higher rates of acceleration, quieter operation, and reduced unsprung weight, many modifications are necessary. Provision for better lubrication of motors has been given considerable study, and an attempt made to provide gearing which will run in oil. Foot control of the motors is a new development by the company. This has appeared desirable in order to relieve the operators of one-man cars from some of the duties which were previously performed by hand. Dynamic braking and car heating are other developments that promise to be of particular advantage in modern cars, and in reducing costs of power. In an endeavor to reduce noise in operation of car equipment, sound-deadening gears have been developed, and improved brake rigging also reduces much noise. The employment of the high speed motor and its drive through double reduction gears is giving gratifying results.

Speed and comfort were stressed as the two most important things to be incorporated in modern cars, by J. C. Thirlwall, General Electric Company. This company has been trying to develop equipment to satisfy the demands for higher rates of acceleration and retardation. The present tendency is to install greater motor capacity in cars, and this has enabled the rates of acceleration to be doubled. Rates of retardation also have been doubled through the use of track brakes in addition to air brakes. Each of these developments should result in a 10 per cent increase in scheduled speed.

Some improvements in air-brake equipment were outlined by John F. Craig, of the Westinghouse Traction Brake Company. He said that the demand for increased car speed has made braking operations more important. Faster operation of brakes enables the car operator to keep his place in traffic since he can stop as quickly as other vehicles. Faster action of brakes also enables the operator to stop his car so as to decrease the length of standing time by making it more convenient for passengers to board and alight quickly.

The importance of efficient employees and a satisfied public in connection with electric railway operation, were stressed by R. S. Tompkins, assistant to the president United Railways & Electric Company of Baltimore. It is now an accepted fact that railway customers must be satisfied. The idea of educating the public to agree with the things done by electric railways does not work out satisfactorily, and should be shoved into the background. Individual handling of complaints has been undertaken in Baltimore and has produced pleasing results. The number of letters of complaints published in newspapers has been reduced considerably, and also the number of complaints made by the public to the Public Service Commission.

Service and co-operation between the railway and public officials spell sucess, according to Norman A. Boyd, Mayor of Binghamton, N. Y. He spoke of the good feeling existing at Binghamton between the company and the city, and said that employee education and effective publicity were influential factors in promoting good will.

The banquet in the evening was addressed by James E. Begg, United States congressman from Ohio, who stressed the necessity for modernization in all industries in order to keep pace with the demands of the times.

Time and Labor-Saving Ideas

from Staten Island

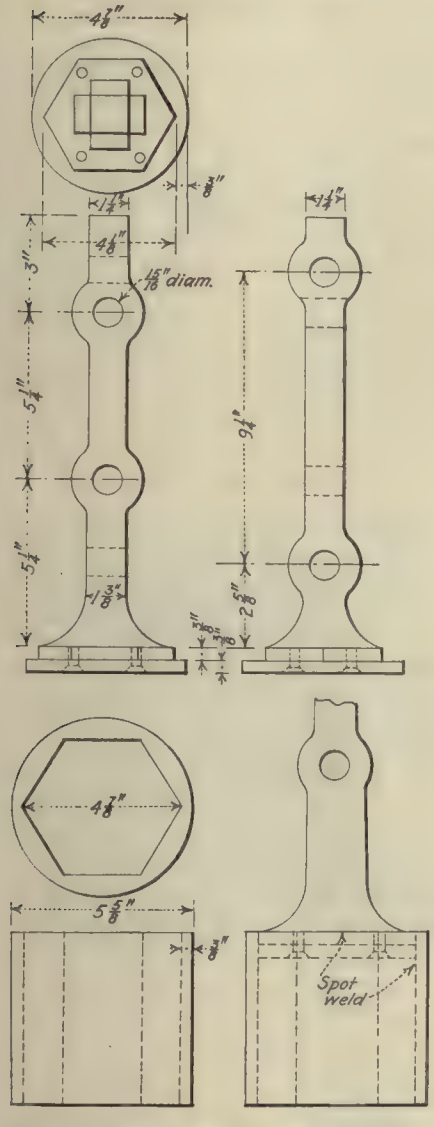


Fig. 1—At top, stem for wrench. Fig. 2—Bottom, left, socket. Fig. 3—Bottom, right, assembly of parts

Wrench Designed With Replaceable Socket

IN A WRENCH, devised in the shops of the Staten Island Rapid Transit Railway, Staten Island, N. Y., the socket can be replaced without renewing the stem.

The stem, shown in Fig. 1, is made of $1\frac{3}{8}$-in. square steel and has four $\frac{15}{16}$-in. leverage holes. The bottom is forged to a hexagonal shape, of such dimensions as will fit exactly the hexagonal hole in the top of the socket. A $\frac{3}{8}$x$4\frac{7}{8}$-in. flat steel plate is screwed to the bottom of the hexagonal forging.

The socket, shown in Fig. 2, is made of steel and has an outside diameter of $5\frac{5}{8}$ in. The top surface is formed with a hexagonal hole to fit the hexagonal portion of the stem, and the inside is shaped to fit the pinion nut. The assembly of these two pieces is shown in Fig. 3. The stem is entered through the socket and the two peripheral surfaces of the hexagonal portion of the top of the socket and the stem are placed in contact. The $\frac{3}{8}$-in. circular plate on the stem is placed against the under surface of the top of the socket. The hexagonal and circular portion of the stem are spot-welded to the socket. This arrangement permits of renewing the socket by breaking the spot-welded joints.

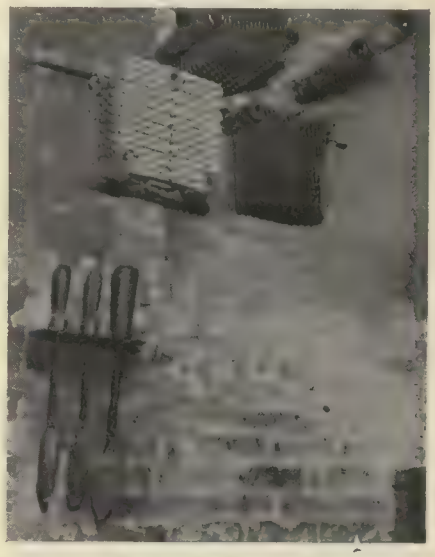
Metallic Sling Lifts and Carries Armatures

LIFTING or carrying armatures by means of hooks, chains or rope slings offers the danger of mechanical injury at the bearing fit, end bells, commutator or end connections. To eliminate this possibility entirely, a flat metallic sling is used in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. The sling is shown in the accompanying illustration.

The sling is made of 0.058-in. gage sheet metal, $\frac{1}{4}$-in. and $\frac{1}{8}$-in. flat plates. The sheet metal is 62 in. long, 12 in. wide at the center, and 8 in. wide at the ends. For a length of 4 in., each end is clamped between two plates, one 8x12x$\frac{1}{4}$ in., and the other, 8x4x$\frac{1}{8}$ in. These two plates and sheet metal are held together by six $\frac{3}{8}$-in. rivets. The over-all length of the sling is 78 in. Each 8x12-in. plate is drilled with a lifting hole $4\frac{1}{16}$ in. from the end, with a diameter of $3\frac{7}{8}$ in.

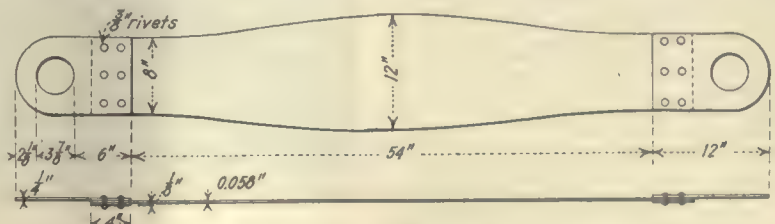
In lifting an armature the sling is placed around the core at the center of gravity, and both end plates are hooked on the lifting device. This design of sling has been in constant use for several years lifting armatures weighing 1,650 lb. each, and not a single failure has developed.

Safe Storage for Rheostat Parts

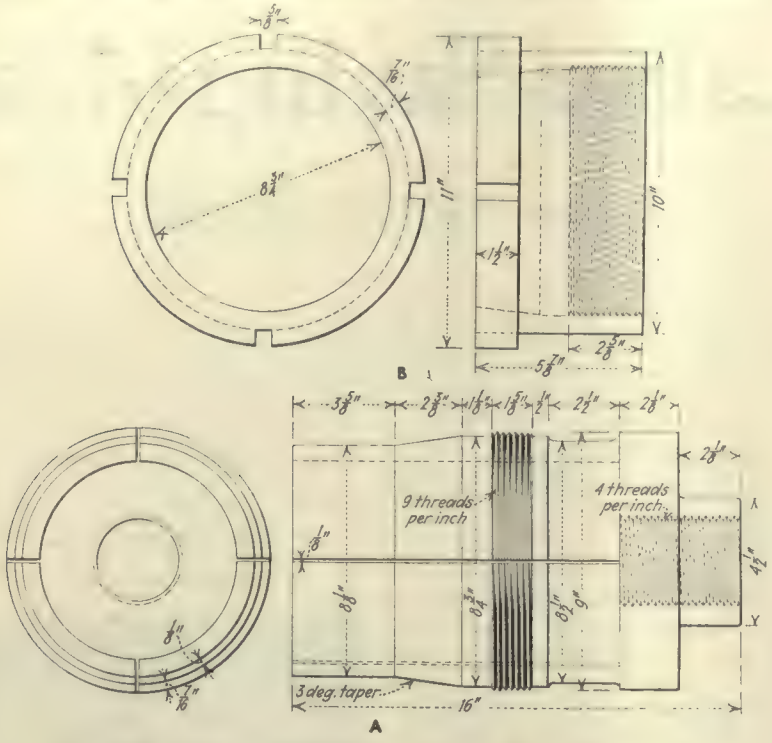


Convenient storage of repair parts assists the workmen

WHEN several mechanics use the same bench while overhauling different types of apparatus, each must see that his daily stock of material is cared for properly to prevent destruction and loss. Confronted with this problem, the Staten Island Rapid Transit Railway, Staten Island, N. Y., tried many suggested schemes for storing rheostat grids and mica washers, but none of the ideas proved satisfactory. Destruction occurred due to the carelessness of workmen. The problem



Armature sling used by Staten Island Rapid Transit Railway



Use of this chuck has resulted in an increase of the boring output

was solved finally by storing the material within reach of the men at the bench on the wall adjacent to it, as shown in the accompanying illustration. Threaded ½-in. rods were screwed into expansion sleeves imbedded in the brick wall. The daily supply is suspended from these rods.

A neat soldering iron rack also appears in the illustration. The rack was made from a piece of ¼x3-in. angle and was fastened to the wall. Slots made in the angles provide a substantial support for the various sizes of iron.

Self-Centering Axle-Bearing Chuck

BEARINGS for axles are given constant attention on the Staten Island Rapid Transit Railway, Staten Island, N. Y. Abnormal wear is not permitted and as a result the bearings are being rebabbitted and rebored constantly. Difficulty was experienced in obtaining a chuck which would permit of heavy service and require a minimum of labor for centering. Consequently Machinist Joseph A. Collins designed and manufactured the chuck shown in the accompanying sketch. It is self-centering. The bearing is placed inside of *A* and when the collar *B* is screwed up the diameter of *A* is decreased as the 3-deg. surfaces come in contact. This centers the bearing accurately and grips it firmly at all points.

The cylinder shown in *A* is made from a solid piece of steel of 9 in. diameter and 16 in. long. It is turned to a diameter of 8⅛ in. for a length of 3⅝ in. and a 3-deg. taper for a length of 2⅜ in. The next 1⅛ in. is turned to 8¾ in. diameter, and the next 1⅝ in. has nine standard threads per inch. The diameter of the next ½ in. is 8¾ in., and for the following 2½ in. the diameter is decreased to 8½ in. Adjacent is a flange 2⅛ in. wide and 9 in. in diameter. This flange has a hub projection 2⅛ in. long and 4½ in. in diameter. The hub and flange are bored and threaded with four threads per inch to fit the lathe spindle. The opposite end of this cylinder is bored to fit the outer diameter of the axle bearing when the adjustable collar *B* is in the full release position. Four ⅛-in. slots are cut longitudinally in the cylinder 90 deg. apart and end at the flange.

The adjustable collar shown in sketch *B* is made from a piece of steel 11 in. in diameter and 5⅞ in. long. The flange is 1½ in. wide and the cylinder is 10 in. in diameter. The flange has four slots ⅝ in. wide and 1 7/16 in. deep to permit the use of a suitable wrench for screwing it on to the cylinder *A*. The inside is bored with a 3-deg. taper and has seven threads per inch for a distance of 2⅝ in. to correspond to the taper and threads on *A*.

Novel Safety Appeal

SAFETY is given careful attention in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. All moving elements of the machinery are guarded carefully and the men are given regular instruction in the advantages of playing safe at all times. Conspicuous bulletin boards appearing throughout the shop give accident statistics and act as a constant reminder to guard against accidents. This safety work has had a remarkable effect in reducing the number of shop accidents. A novel safety appeal is printed on the span girder of the overhead traveling crane. As shown in the illustration, this reads "Safety Above All Things." This meets the eye upon entering the shop and immediately impresses the observer with the fact that safety predominates.



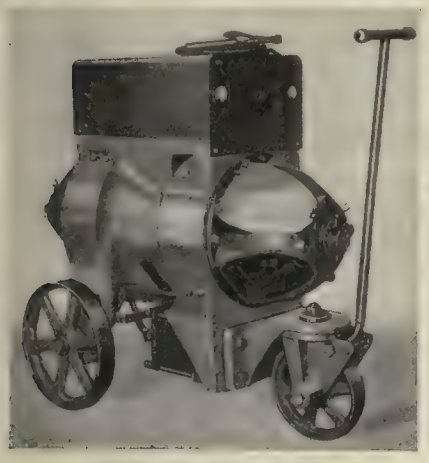
Safety warning on overhead crane

Improved Equipment Suggestions

200 Ampere D.C. Arc-Welding Set

A RECENT development of the Westinghouse Electric & Manufacturing Company is the 200-ampere d.c. welding set. This has particular application in a large number of shops, especially in street railway and railroad work, where only direct current is available for the driving motor of the welding set. It is designed so that either a 230 or 550-volt driving motor may be used. The construction is such that the set may be used either as a portable or stationary unit.

The accompanying illustration gives



Welding set for electric railway shops

an idea of the simplicity, compactness and ruggedness of the self-contained unit. The driving motor and generator have a common frame and common shaft, supported by ball bearings. The control is mounted on the top as a part of the frame and is protected by a sheet steel cabinet. Three roller bearing wheels attached to the frame make the set readily portable and give a welder with small over-all dimensions and a low center of gravity. For stationary use, the running gear can be omitted.

The rating of the unit is in accordance with the N.E.M.A. standards of practice, being 200 ampere, 1 hour, 50 deg. rise in a resistance load at 25 volts. The welding range is 60—300 amperes.

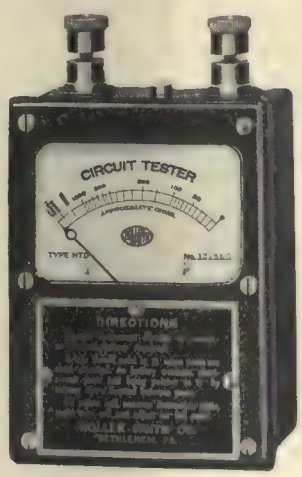
The driving motor of the set, a special type S.K., wound for either 230 or 550 volts, is compound wound and maintains constant speed with a voltage fluctuation of not more than 10 per cent. The motor starting rheostat with low voltage protection is enclosed and mounted in a sheet steel cabinet on top of the set.

The generator is a single operator, constant current, differentially compound wound and is separately excited from the motor supply line. The field rheostat of the generator gives a one-dial adjustment over the entire welding range.

Portable Direct-Reading Circuit Tester

FOR locating open circuits and reading the resistance of circuits, the Roller-Smith Company, New York, N. Y., announces a small portable direct-reading circuit tester. The instrument is 4½x3x1½ in., and weighs only 19 oz. It includes a small high-grade d'Arsonval d.c. voltmeter, connected in series with a small dry cell. The arrangement is such that when the two terminals of the instrument are connected the circuit is completed. The instrument pointer will indicate full scale when the terminals are short circuited. The scale is arranged to read ohms directly from zero to 10,000.

The instrument is inclosed in a



Improved direct-reading circuit tester

heavy sheet-metal case with black finish and is equipped with nickel-plated binding posts. An etched metal instruction plate is attached to the front of the instrument, which gives instructions regarding the checking of the calibration and replacement of the battery used in the instrument.

Automatic Grinder Lights

FORGETTING to turn off the light at the grinders is impossible when the new type automatic grinder light just brought out by the Hisey-Wolf Machine Company, Cincinnati, Ohio, is used. A conduit bracket supports the lighting fixture. Flexible metal holders permit adjustment to any desired position. Lights are



Grinder equipped with automatic lights and switch treadle

turned on or off automatically with the off and on switch of the control. Grinders are furnished with either push buttons or treadle switch. The treadle provides for turning off the current automatically as soon as the operator leaves the machine. The treadle extends the entire width of the column and permits simultaneous operation of two workmen.

Extension for Expansion Reamer

TO CONVERT the piston pin type of reamer into a steering-knuckle type a special extension, known as the King Bolt Pilot, has been designed by the Scully Steel & Iron Company, Chicago, Ill., for use with the Scully J.M.C. expansion reamers. One size of King Bolt Pilot will fit several sizes of J.M.C. reamers. The regular taper pilot bushings or guides as used with the piston pin type are used with the King Bolt Pilot to center the reamer.

News *of the* Industry

A New Note in a New Year's Message

Eastern Massachusetts Street Railway sets forth its ideals. Urges men to meet criticism intelligently

R. B. STEARNS, vice-president and general manager, on behalf of the Eastern Massachusetts Street Railway, wished the public a happy and prosperous new year and outlined some of the ambitions of his company for 1929 as follows:

To continue to deserve the confidence and co-operation of the 140,000,000 of car and bus riders annually in 19 cities and 54 towns in Massachusetts.

To convince the public completely that it is cheaper, speedier, safer and more comfortable to ride in our cars and buses than to use their own automobiles.

To sell the idea to public authorities everywhere that unrestricted auto parking on highways in the business districts of cities and towns is not only unfair to the street railway but also to the traveling public.

To meet courageously, truthfully and intelligently all unjust criticisms of the road and to act promptly and decisively upon all well founded complaints and advice for improvement of service.

To follow up the campaign among blue uniform men (our salesmen) for courtesy founded upon the most effective business maxim, "The customer is never wrong."

To co-operate with highest efficiency and lowest possible fares consistent with the rights of property owners to obtain a fair and reasonable return on their investment.

In every carhouse, manager's office, repair shop and in the Boston office on Dec. 29 appeared the following notice addressed to employees:

Are you for your bread and butter? If so, don't be afraid to defend this street railway from unjust attack. To hold our jobs we must be one great big family, all for one and one for all. If we all pull together and do our best, nobody can do us any harm. We are for you. Are you for us?

Mr. Stearns put special stress upon the necessity of vigorous action by the municipal authorities involving what he described as "The Parking Crime" in the business streets of many cities. He said:

Almost every Saturday night in the majority of the cities where we operate the traffic tangles are indescribable and after a very careful study of actual conditions we are certain that this is due primarily either to the unregulated, half-hearted or unsystematic supervision of parked autos or the absence of any enforceable rules.

I say, all honor to the traffic policemen in every one of our cities and towns. During the past ten years I have never heard of a single instance in which a traffic officer did not do everything he reasonably could to give street car passengers a square deal.

Street cars and buses are moving highways. The people who ride in them are entitled to the right to be conveyed to their destination without being delayed and obstructed by parked automobiles.

Public highways were never built at great expense to taxpayers to become public garages. The merchant who believes that unrestricted parking helps him is making a monumental mistake. He might as well have the huge merchandise box in front of his store as a parked automobile.

Mr. Stearns contends that the streets belong to the busy man—not to the lazy and luxurious few. He asks why hundreds of people should be inconvenienced going to and from their work by someone who insists on leaving his automobile in the way of traffic. He asks why one citizen should be permitted to appropriate 150 sq.ft. of property for an hour or two, thus forcing all other citizens to scramble around at the risk of their lives. This, he says, is preposterous.

On Jan. 15, 1919, the Eastern Massachusetts Street Railway started out under public trustees on a career which has attracted country-wide attention.

It is the successor of the Bay State Street Railway and became a state operated railway under the provisions of Chapter 188 of the Special Acts of the Massachusetts Legislature of 1918.

Under this legislative act public control was to continue for ten years, and on Jan. 15, 1929, this period ended. The last session of the Legislature decided to continue public control for another five years. Messrs. Arthur G. Wadleigh and Fred J. Crowley, who have served for the ten years, were reappointed recently by Governor Fuller. The directors have chosen Lester Watson their representative among the trustees.

New Traffic Regulations Work Well

Effort of New York's Police Commissioner to bring order out of chaos in theatrical district successful. Minor modifications likely. Non-parking ban to be extended

DISTANCES which formerly took from eight to nine minutes to traverse under the old system of traffic control in the zone between Fifth and Ninth Avenues, and 39th and 52d Streets in New York can now be covered in an average of about four minutes under the new scheme of regulation during theater hours.

The initial test of the new system by which theater curtains are "staggered," parking forbidden, cruising taxicabs barred, buses forbidden to turn into their terminals to discharge their passengers and all turns prohibited went into effect on the evening of Jan. 21, with more that a tinge of carnival spirit and just a suggestion of the bizarre.

The most encouraging report and the one which led Police Commissioner Whalen to pronounce the new system "a huge success," was the one from his first deputy commissioner, Mr. Hoyt, who asserted traffic had been speeded up 50 per cent by the new system.

> THERE is no reason on earth why the streets should be turned into public garages. We expect to eliminate parking except for legitimate and actual commercial purposes.
>
> —COMMISSIONER WHALEN

Cruising over the whole area without taking advantage of the Police Department insignia on his automobile and without using the siren which takes the place of a horn on official cars, Mr. Hoyt tested out the new traffic regulations from the viewpoint of the average citizen. This is what he found:

At the peak of the early rush, the worst of the entire evening, it was possible to drive from Fifth to Ninth Avenue through 45th Street, with its eleven theaters, in the unheard-of time of four minutes after the no-turn rule became effective at 8 o'clock.

It took three minutes and four seconds to drive from Ninth to Fifth Avenue through 44th Street, while 42d Street, which has sixteen theaters and two car tracks, was traversed from Fifth to Ninth Avenue in four minutes, despite one delay for a trolley car discharging passengers.

Fifth and Ninth Avenues, where even the commissioner expected a jumble of traffic because it was from these thoroughfares principally that turns into the zone were to be made, were rivers of smoothly flowing traffic, on which it was possible to drive from 42d to 50th Street and back again in half the time it took under the old system of traffic control.

Deputy Chief Inspector Coleman, after surveying the outlying sections of the zone, pronounced the new system a success and declared that 42d Street was "just like the main street of a small town" while Commissioner Whalen's plan was in effect.

Pedestrians fitted perfectly into Commissioner Whalen's traffic demonstration. In fact, as the New York *Times* said, they had to do so. At each corner a sergeant and eight husky patrol-

men saw to that. The man or woman afoot went ahead when the green light signaled that they might, and remained in groups on the corners when the red light gleamed against them. The sergeant and his sturdy men quickly overhauled any persons who sought to dash against the traffic and courteously but firmly shepherded the strays back to the curb.

If the traffic rules failed to give the walkers an "even break," the pedestrian had it all to himself in the side streets. All parking had been done away with and the streets never looked so wide or so empty. The man who was walking on the north side of the street and who decided that he would move down to the south side did not have to hurdle parked cars, or insinuate himself between the dirty bumpers of machines. He just walked over, and he had the whole street in which to do it.

Subway lines reported traffic increases during the theater rush period, while taxicab operators experienced a distinct falling-off in business. Railroad terminals reported that fewer passengers missed trains because of delayed passage through the theater zone. The suburban bus lines with terminals in the restricted area were only slightly affected by the parking restrictions.

On the Interborough's west side subway lines the traffic from the Bronx and upper Broadway from 8 to 8:45 p.m. was reported considerably heavier than usual. Operating officials of the company attributed the increase to the new regulations which, they believed, caused many to resort to the underground routes rather than enter the restricted area in motor cars. On the B.-M. T. lines the traffic from points north of Times Square was slightly heavier than normal. Both the I. R. T. and B.-M. T. reported that traffic from points south of Times Square was no heavier than usual. Operating officials of both companies expressed the belief early last night that the after-theater travel on their lines would be heavier than normal. However, no special preparations were made to handle any surplus traffic.

The group of suburban bus operators with terminals in the theater zone reported that they were but little affected by the new regulations because their schedules were already arranged to accommodate persons using the lines to return to homes in New Jersey and other suburban sections. Aside from slight inconvenience in foregoing left and right turns, causing them to change their normal routes a trifle, these transportation agencies suffered little from the new traffic rules. In most cases the buses remained in their terminals during the restricted hours, awaiting the closing of amusement places.

Mr. Whalen says the pedestrians are the greatest problem of the reformation experiment, hotel keepers, taxi-drivers' unions, garage-men's associations and others to the contrary notwithstanding.

The traffic control plan banished empty cabs from the zone bounded by Fifth and Ninth Avenues and 42d and 50th Streets between 7 and 9:30 o'clock, when the incoming traffic is at its peak, but under a subsequent modification, eight taxi stands have been designated at alternate corners of Fifth and Ninth Avenues. Officials of the hack bureau will be in charge of each station and upon receipt of a call from any hotel, will immediately give a driver authority to enter the zone "empty."

By this device five cabs will be allowed to park at each station, and the number will be replenished by drawing upon passing cabs as fast as the others leave.

As a result of his modifications establishing taxi stands and allowing baggage trucks in the zone, Mr. Whalen believes he has put to rest the fears of hotel owners, a committee of whom conferred with him on Wednesday and laid their grievances before him.

One hotel man among the delegation that conferred with the commissioner said abolition of parking added difficulties to guests unable to get accommodations at a hotel, for the driver isn't permitted to wait while they find out. Another claimed that the "no turn" rule, which lengthens taxying distances, increased the cost of the journey from certains hotels to terminals. Mr. Whalen said:

To restore parking and right turns would strike at the very heart of our plan, which has already demonstrated its worth. As for the first criticism, I see no reason why we should make any drastic change because of something that is the exception rather than the rule. Nor do I see any reason why the turns should be reinstated because of additional costs. It is already proved that the new plan has brought about a great saving in time, which is more than adequate compensation, I believe.

He told hotel men a perfect code of regulation cannot be made in a week and that no regulations could satisfy all the far-flung and diverse interests of any section. The disposition of merchants and others appears to be to give the commissioner a chance. One commentator said:

We are going to give Commissioner Whalen a good chance to regulate the situation. In my opinion, it is too soon to ask for changes. What if it does interfere with business a little at first? We firmly believe the bad features will be corrected as soon as he discovers any mistakes. The non-parking rule, the principal feature of the plan in my opinion, works splendidly.

Twin Cities Fares

The St. Paul City Council authorized an agreement with the Twin City Rapid Transit Company providing for the establishment of the same fare in St. Paul as may be ordered by the Minnesota Railroad & Warehouse Commission for Minneapolis. Since that time the state commission expert has recommended a fare of nine tokens for 65 cents compared with present rate of six for 40 cents and a cash fare increase to 10 cents from 8 cents for the Minneapolis system of the Twin City Rapid Transit Company.

$55,000,000 Extension of Boston "L" Suggested

Rapid transit extensions to cost $55,000,000 are proposed by the special transit commission which was authorized by the Massachusetts Legislature in 1927 to study the transportation problems of Boston.

Briefly, the proposition is to extend the Boston Elevated Railway by sending out rapid transit lines, subways and elevated structures, into the suburbs on all sides of Boston and to finance the project by a tax levy in all the cities and towns that will be benefited by it.

The plan has already been laid before the Mayors and the chairman of the selectmen in those cities and towns, and the complete plan with maps and charts will be presented to the Massachusetts Legislature within a few days. It is estimated that it would add from 28 to 30 cents per $1,000 to the tax levy in the various places.

Henry I. Harriman, who is chairman of the special transit commission, is now chairman also of the Boston Elevated Board of Public Trustees. He is strongly in favor of the plan, and may be influential in committing the Boston Elevated Railway to the proposal if the Legislature approves it.

Nine Suggestions for Chicago Solution

A statement of nine fundamentals for the settlement of the transportation problem in Chicago with the recommendation that agreement be reached on these fundamentals and that legislation be sought at the present session of the General Assembly has been submitted to the transportation committee of the City Council by railway interests of the city.

The Frankhouser sub-committee of the local transportation committee, however, has countered with objections to certain of the fundamentals, and considerable debate appears to be necessary before an agreement is reached. The Aldermen object particularly to providing for a straight out indeterminate franchise and propose instead an alternative of a fixed-term franchise for not to exceed 40 years, or an indeterminate franchise which will give the city a right to purchase the property, on reasonable notice, at the price fixed by the ordinance, with a further provision that all of the receipts in excess of operating costs, sinking fund and return to the company shall go to the city and be used for the amortization of the properties. Previously the aldermen had expressed themselves in favor of the terminable permit.

The nine fundamentals proposed by the companies are as follows:

1. A unified and comprehensive transportation system for Chicago, consisting of surface and elevated lines to be operated in connection with city-owned subways and supplemented by motor bus lines.
2. A service-at-cost, consisting of the items specified in the ordinance.
3. An indeterminate franchise on condi-

tion that the city have the right to purchase the traction system at any time on reasonable notice at a price fixed by the ordinance and with the further provision that all or part of the receipts in excess of operating costs, sinking fund, and return to the company go to the city.

4. An agreed valuation on the existing railway properties to be known as the initial capital value, the cost of all expenditures for extensions and betterments to be added to the initial capital value.

5. A reasonable return to the company on its capital value, the initial rate of return to be specified in the ordinance and such rate of return to continue in effect until changed by order of the transit commission.

6. Agreement by the new railway company to spend the several amounts mentioned and during the respective periods set forth in the ordinance for extensions and betterments.

7. Agreement by the city to construct the subways specified and within the periods sanctioned in the ordinance and the equipment and operation of such subways by the new transit company; the cost of such equipment to be added to the company's capital account.

8. Establishment of home rule for Chicago by the creation of a local transit commission whose members shall be appointed by the city; the commission to have jurisdiction over the transportation company similar to that which the Illinois Commerce Commission now exercises.

9. A referendum and approval by a majority of voters voting thereon and the enabling legislation expressly so to provide before ordinance becomes effective.

Trolley Service in Methuen to Continue

About 200 residents of the Town Farm and Hampshire Roads districts of Methuen, Mass., who will be affected by the discontinuance of service by the Massachusetts Northeastern Street Railway, met recently and voted in favor of a proposal made by the Eastern Massachusetts Street Railway to supply service.

Attorney Edward McEnally, representing Earle Warwick of Malden, who filed a petition in Methuen to operate a bus line over the route of the Northeastern company, said that when the Massachusetts Northeastern Street Railway served a notice of discontinuance of service it thought only of the dollar.

Fred A. Cummings, vice-president, representing the Eastern Massachusetts Street Railway, said that if the Department of Public Utilities had not requested the Northeastern to run, and if the railway had not done so, he would have operated Eastern Massachusetts cars on that line and only force of arms would have stopped him. If the residents of Methuen wanted railway service the Eastern Massachusetts would purchase the line from the Northeastern. Mr. Cummings also stated that if this were done the Eastern Massachusetts would be unable to continue service permanently unless the Methuen Board of Selectmen and the Lawrence City Council revoked the franchise of the Northeastern and the transfer was approved by the Department of Public Utilities.

Relief Suggested at Grand Rapids

City consulting engineer advances proposal. Wants all common carrier transportation service under railway control

An important move toward municipal subsidizing of the Grand Rapids Railroad, Grand Rapids, Mich., by taxation relief measures, at the same time grouping of all local common carrier transportation service under the control of the railway, has been made by Gerald J. Wagner, consulting engineer to the city, who has submitted a report to the City Commission dealing with the local transportation problem. Mr. Wagner backed his report with a recommendation for immediate consideration and action. Among other things Mr. Wagner recommended:

Elimination of the requirement that the railway pay for the construction of pavement between the tracks.

Reduction of taxes to a point where the railway can compete with bus operation.

Authorization of the railway to purchase a taxi system and sufficient additional buses so that special group service can be given, ranging from individual taxi service, group bus service up to 31-passenger bus capacity or more, and also regular mass transportation and rail cars and buses operating on regular schedules.

Insuring the railway reasonable protection on its investment providing it furnishes adequate rail, bus and taxicab service to meet the demands of the public as called for by good city transportation practice.

Elimination of one short avenue line and substitution of a bus line that will serve a larger patronage.

Special peak hour service from several points.

Group service from a number of points.

Taxicab service from any part of the city to any other part on call.

By placing the foregoing recommendations in effect, Mr. Wagner said, the common carrier transportation service furnished will not only conform to the standard city transportation practice, so far as routing and the territory served is concerned, but it will also permit individual and special group service to be rendered for the benefit of both the company and the city, namely:

By having the company handle all the common carrier service an earnest effort will have been made to increase the earnings of the company to a maximum before actually subsidizing it, through general funds, for the return, taxes and depreciation on the amount already included in its investment for pavements, which would be approximately sufficient to permit the company to earn enough to insure new capital for its business.

It will also reduce to a minimum the congestion in the downtown section.

It will produce the greatest general efficiency in the common carrier transportation service, thus reducing to a minimum the amount which the city must necessarily consider in the future as a subsidy to the common carrier transportation service to attract sufficient capital to insure to the city in the future continuous, reliable and efficient transportation service to meet the economic needs of the city.

In further detailing his report, Mr. Wagner says:

From our experience during the last ten years, it is evident there are two outstanding conditions which have been constantly before us as they relate to the handling of mass transportation in the city:

The growing use of the individually owned automobile.

The elimination from the existing mass transportation system owned by the company of many of the burdens carried by the system and which have prevented it from earning sufficient on the "fair value" of the property after paying operating expenses, taxes and depreciation to safeguard the existing capital in the property and to encourage the owners to place new money in the property for rehabilitation and new capital requirements.

Publication of this report and its recommendations in the local newspapers has brought favorable editorial comment and also supporting comment from the readers of those newspapers. The Grand Rapids *Herald* said editorially:

Boiled down to its ultimate, the report by Consulting Engineer Gerald J. Wagner means that, if Grand Rapids is to continue to have railway service, patronage must be increased or the burden upon the railroad must be decreased. That plain gist of the expert's opinion is borne out by even the most superficial study of the company's records and reports.

While the population of the city and its environs has been steadily growing, the railway's patronage has been as steadily falling off. It now has reached a point where, unless something is done, this metropolitan area of 190,000 people will be deprived of all transportation service except such as is provided by buses, taxicabs and private motor cars. To abandon rail service would be to handicap the city's retail trade immeasurably. In fact, directly all community relationships would feel the loss.

The best way out of the difficulty, of course, would be to increase the company's revenue. But it is the general opinion of experts, both those retained by the city and the company's agents, that no further increase in fares is feasible. Only one other alternative remains: Easing the burden of financial obligations which the company is required to carry.

The outstanding opportunity for action is in the matter of payment for pavement between the tracks. The railroad now is required to pay for this pavement as well as for one foot on either side of the rails. Taxicab companies and bus lines, which compete with the railway, make no such contribution, although they use the streets.

One attempt was made by referendum to eliminate this paving burden, but it failed. At that time, however, the city did not confront a definite crisis as regards rail transportation. It is not improbable that, if the issue were properly presented at the spring elections, the vote might be reversed.

We have seen, in the case of our interurban lines, what can happen when motor car competition traveling over publicly maintained roads takes away the business of a railroad. The same thing can happen in Grand Rapids to a railway service which is nationally recognized for its efficiency. And Grand Rapids does not want that to happen.

Railway and Vehicular Tunnel Suggested for Baltimore

A tube under Franklin Street, from Howard to Calvert Streets, providing for both street car and vehicular traffic, is one of the outstanding recommendations made by the Baltimore Traffic Committee, appointed some months ago by Mayor William F. Broening. In considering the matter the committee resorted to the use of checks made by the United Railways & Electric Company and the report rendered three years ago by Kelker, De Loeuw & Company in making its survey of the existing conditions. Dean J. Locke, of the United, was one of the members of the committee.

The committee confined its first report to suggestions dealing with east and west traffic, but will report later on north and south traffic. Only the downtown section of the city was under consideration. As a preliminary measure to afford relief from a condition conceded to be bad, the committee suggested a no-parking plan to be followed by adoption of other measures from time to time. The United Railways & Electric Company has been a strong advocate of no-parking in the downtown section of the city but previous efforts to bring this about have met with failure.

The committee suggested the Franklin Street tunnel plan for future consideration. It was pointed out that the tunnel would eliminate many curves on the route of the No. 4 cars of the United. It also was explained that traffic using the tunnel could be diverted north or south on Calvert Street to a proposed viaduct on Bath Street, or to Pleasant Street.

The United is deeply interested in the proposals which have been made by the committee. It operates cars on all the streets dealt with in the report.

$5,600,000 Municipal Transportation Bond Issue at Detroit

A proposed bond issue of $5,600,000 has been approved by the City Council at Detroit, Mich. The proposition, which was recommended by the Street Railway Commission, was presented to the Council by City Controller Percy L. Monteith and John H. Morgan, city statistician and auditor for the Department of Street Railways.

Of the proceeds of the issue, $1,270,000 would be used for 200 new buses, including the 120 now in use in the de luxe service, and $1,360,000 would be used to pay for the 100 new Peter Witt type street cars, delivery of which is to start in March, it was announced. It is proposed to use the balance, amounting to $2,970,000, in the improvement and extension of the municipal lines.

It was pointed out by the controller that the bonds could be issued as budget bonds, and that it would not be necessary to have the bond issue approved at a general election. A possible annual saving of $125,000 in interest would result, as the budget bonds could be sold at 4½ per cent interest, whereas most of the bonds outstanding against the Department of Street Railways bear interest at 6 per cent.

If the proposed bond issue is sold, the total indebtedness of the D. S. R. will amount to $31,000,000. This includes the sum which the department still owes to the Detroit United Railway on the contract for the purchase of the lines.

What Governors Had to Say

Incoming Governors of 1929 gave little or no attention to the study of transportation although they stressed the importance of highway appropriation and development. This characterization applies to messages to the Legislatures of Maine, Connecticut, Vermont, South Carolina, Indiana, Wisconsin, Delaware, Tennessee, North Dakota, Iowa, Arizona and Montana. On the subject of New York's highways Governor Roosevelt told the Legislature that the whole problem was so involved in the broader subject of taxes and of budget that he would present it later.

With more specific application to the railway field were the messages of Governor Allen of Massachusetts, Governor Caulfield of Missouri and Governor Emmerson of Illinois.

As mentioned in these pages before, Governor Allen, referring to the problem of the Boston Elevated, said that it was his hope that the experience of past Legislatures joined to the fresh vigor of a new one would find an equitable solution and place the matter on a sure foundation. He believed a continuation of the present policy of private ownership and public control was the most economical and the most efficient method of solution. At the end of a stipulated period of public control, the situation should be susceptible to such revision as conditions and circumstances might indicate as desirable.

He also asked the Legislature to look with favor on a program for liberal extension of rapid transit lines, based on the thought that such extension and improvement of service benefit not simply those who ride upon the cars and trains but the entire community. He recommended that the Legislature approach all proposals for transportation improvement with the thought in mind that the cost of such rapid transit extension should be borne by others than the car riders, said a report would soon be made public on the study of the transportation needs of Boston, Chelsea, Revere and vicinity and recommended additional legislation if necessary for the construction of the East Boston tunnel.

Governor Henry S. Caulfield in his first message to the Missouri General Assembly recommended that the Missouri Public Service Commission be facilitated in the making of rate-base valuations for public utilities through the amending of the laws which now hamper this work. On this point the Governor's message reads:

> At present the Public Service Commission is restricted in its important function of finding valuations for rate-making purposes, by the method of making appropriations, although this expense is not paid by the State Treasury. I recommend that the law be amended so that valuation work is not hampered or delayed by these artificial restrictions.

Governor Louis Emmerson of Illinois in his inaugural address at Springfield, Ill., delivered before a joint session of the General Assembly, dwells at length on public utilities and the state's functions in their regulation.

On these points the Governor's message reads:

> The purpose of public utility regulation is to provide ample protection for the public from exorbitant rates or insufficient or unsatisfactory service. This purpose is not served by hampering development of utility companies or preventing their earning a fair return on investment. Regulatory supervision and laws which cripple utilities are no more in the interest of the public good than are those which give to corporations an undue advantage in service or charges. An honest, impartial and intelligent exercise of the regulatory powers of the State Commerce Commission will be the established policy of this administration.
>
> Perhaps the most important utility legislation to come before this Assembly will be in relation to the Chicago traction problem. The franchise of the Chicago surface lines, which carry about three-fourths of the entire transportation load of the city, expired two years ago, and since that time the properties have been operated under temporary permits extended from time to time. The north and west side lines are in federal receivership and the owners of the properties have found it impossible to make needed extensions and improvements because of their inability to borrow money pending the securing of a grant from the city.
>
> Involved in this franchise question is the proposal, discussed for many years, of a unification of surface, elevated and bus lines and the construction of subways.
>
> Obviously, this is a Chicago problem and the people of that city and the traction companies should agree upon the necessary enabling legislation before asking for action by the General Assembly.

The Governor pledges the Assembly and the state administration to assist in any effort upon which there is a general agreement, for all appreciate the need of improved local transportation in the metropolitan area in order that Chicago may continue to expand and develop.

Paving Debt Paid in Poughkeepsie

A sum in excess of $109,000 was paid recently by the Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., to the city in settlement of paving debts. A stipulation filed in the office of the County Clerk states that the projected suit against the company to recover the full amount of $190,382 in paving assessments shall be discontinued. The claims arose out of a provision that the railway must pay for paving between its rails and for 2 ft., each side of the rails.

Joint Association Meetings in Missouri

Following are programs which have just been completed for the joint meeting of the Midwest Electric Railway Association and the Midwest Claim Agents Association to be held in the Robidoux Hotel, St. Joseph, Mo., Feb. 7-8:

MIDWEST ELECTRIC RAILWAY ASSOCIATION
THURSDAY, FEB. 7, 1929

"A Fair Fare for Every Customer," by Walter Jackson, fare and motor-bus consultant, New York City.

"Interurban Fares," by Robert B. Campbell, president and general manager Arkansas Valley Interurban Railway, Wichita, Kan.

"Urban Fares," by William B. Bennett, director of research St. Louis Public Service Company, St. Louis, Mo.

Discussion of fares led by H. B. Cobban, general manager Northeast Oklahoma Railroad, Miami, Okla.

Round table luncheons to continue discussion of fares

Interurban, chairman, Robert P. Woods, president Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

Street Railways, chairman, Charles A. Semrad, vice-president and general manager St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

"Development in City and Interurban Equipment," by Charles O. Birney, superintendent of car construction Stone & Webster, Inc., St. Louis, Mo.

"Good Will and Employee Cooperation," by C. D. Porter, vice-president and general manager Omaha & Council Bluffs Street Railway, Omaha, Neb.

Banquet and dance, Robidoux Hotel, for both associations

"Forty-six Years," by Earl W. Hodges, director of personal relations Henry L. Doherty & Company, New York City.

JOINT MEETING
FRIDAY, FEB. 8, 1929

"The Legal Aspects of Operation," by H. S. Robertson, president Denver Tramway Corporation, Denver, Col.

Discussion, led by D. L. Fennell, general superintendent of transportation Kansas City Public Service Company, Kansas City, Mo. and D. M. Finch, claim agent Des Moines City Railway, Des Moines.

"Interurban Claims," by H. C. White, division claims attorney Illinois Terminal Railroad, Decatur, Ill.

Business Session

MIDWEST CLAIM AGENTS ASSOCIATION
THURSDAY, FEB. 7, 1929

President's address, by G. R. Whitmore, general claims attorney Illinois Terminal Railroad, Peoria, Ill.

Report of Executive Committee.

Report of Secretary-Treasurer.

"Industrial Surgery," by Dr. J. F. Hassig, surgeon Kansas City Public Service Company and president of Kansas State Medical Association.

Discussion

"Motor Vehicle Accidents," by Von L. Baker, claim agent St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

Discussion

Luncheon, followed by round-table discussions

"Blind Accidents," by W. B. Bracken, claim agent St. Louis Public Service Company, St. Louis, Mo.

"Safety," by H. M. Shaw, insurance and safety engineer Illinois Power & Light Corporation, Chicago, Ill.

"Law Suits," Trevor Neilson, general claims agent East St. Louis & Suburban Railroad, East St. Louis, Ill.

Employee Education Vital

Holding its first meeting at association headquarters, New York City, on Jan. 14, the committee of the Transportation & Traffic Association on the employee decided to continue the study of certain subjects brought out in the report of last year's committee on employee-customer contact, of which it is, to an extent, the successor. The education of the employee, with particular reference to motormen and conductors, in matters relative to their company's economic status was placed first in importance, and a sub-committee, consisting of S. E. Emmons, chairman; H. H. Fenton, E. C. Spring, Jeff. L. Alexander, F. W. Allen, B. W. Arnold and Tom P. Walker, was appointed to study this subject.

In recognition of the excellent results report from Boston and from Cleveland in the study of accident-proneness, it was decided to continue the study of this subject, to which a sub-committee consisting of Dr. Slocombe, C. H. Evenson, L. P. Baurhenn, A. LeRoy Hodges, D. C. O'Dowd, R. M. Reade and R. W. Emerson was assigned. A third sub-committee, to cover the subject of selection and follow-up, was composed of W. Frank Persons, E. K. Miles, D. A. Scanlon and A. W. Brohman. Leslie Vickers, economist on the association staff, was directed to act as ex-officio member of each sub-committee. The committee will hold its next meeting in Chicago at some date to be announced later.

Among those who attended the meeting were R. W. Emerson, chairman, H. H. Fenton, C. S. Slocombe, S. E. Emmons, E. K. Miles, E. C. Spring, Leslie Vickers, Guy C. Hecker and J. W. Welch, general secretary.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

More Subway and Vehicular Tunnel Talk in New York

A plan for the construction of a subway and vehicular tunnel from the northeastern district of The Bronx through the east side of Manhattan, thence to Brooklyn, to be undertaken by private capital at a cost exceeding $400,000,000 and turned over to the city "at the end of a reasonable period for the amortization" of the investment, is announced on behalf of a group of business men by Logan Billingsley, president of The Bronx Chamber of Commerce. Nominal toll charges for vehicles using the tunnel and subway operation at a 5-cent fare are planned, Mr. Billingsley declared.

Wage Increases on Illinois Lines

The 1,500 motormen, conductors and bus drivers employed by the Illinois Traction System (The Illinois Terminal Railroad) have received wage increase ranging from 3 cents to 6½ cents an hour. This brings the wage scale of all motormen and conductors, whether new or old employees, to 70 cents or more an hour. This new agreement has been signed by the company and the five local unions with which its employees are affiliated. It provides that motormen and conductors in passenger service who formerly received 67½ cents an hour will receive 70 cents; motormen and conductors in freight service who were paid 70 cents will receive 75 cents, and operators of one-man buses have been raised from 60 cents to 66½ cents an hour. Increases date back to Dec. 1.

Substitution Considered on Ohio Interurban

Whether the Cincinnati, Lawrenceburg & Aurora Traction Company is to substitute buses for electric cars on the portion of its line within the city limits of Cincinnati, Ohio, or even for its entire length from Aurora into Cincinnati, is under consideration. This was developed at a public hearing held on Jan. 17 by the traffic committee of City Council. Charles H. Deppe, president of the railway, said that owing to the death of Charles A. Hinsch, illness of other directors of the company and

engineering considerations, he was not prepared to make a statement at present, but hoped to be able to do so within two weeks.

Mayor Seasongood suggested that a report that had been made on the subject by City Manager Sherrill should be read. This disclosed that under plans of the Cincinnati Street Railway it was proposed that the cars of the Aurora interurban road stop at the corporation limit and that buses be used into the city from that point. That would eliminate the necessity of changing cars at Anderson's Ferry inside the city. Colonel Sherrill added that the interurban was considering plans for substituting buses on its entire route from Aurora. Mr. Deppe replied that no plan as yet had been approved by the directors of the company. On motion of Mayor Seasongood, it was decided to meet again on Jan. 29 when a final decision would be made by the company or city.

Service Threatened in Muskegon

The first railway in Michigan and the third in the United States to be operated electrically, when "juice" took the place of mule and horsepower—the Muskegon Traction & Lighting Company, Muskegon, Mich.—probably will be abandoned unless a fare increase is granted. This action has been forecasted by an announcement by B. A. Powell, vice-president and general manager, that a continuance of decreased revenues will make continuation of the service impossible. His announcement will be laid before the City Commission immediately, and a hearing requested at an early date.

Mr. Powell declared that necessary repairs and capital outlay could not be made, that safe operation could not be continued with the present low revenues. He announced that for more than fifteen years the lines have been operated at a loss, failing even to pay interest charges. The increased use of private automobiles and buses, not only by business and professional men, but by factory workers as well is cited as the cause of the present crisis. Only at rush hours are the cars paying their way.

Seven years ago, Muskegon Heights voted 8 to 1 in favor of cars over buses and until recently the Muskegon City Commission co-operated with the company by rejecting applications for competing bus lines. Lately, however, this policy has been abandoned by the broadening of bus service to parallel or overlap car lines. This is said to have been another factor in the traction company's decision. At the same time, the possibility of abandoning the railway has been discussed and the Muskegon Heights City Council, in considering bus applications now pending, questioned operators as to their ability to supplant the cars in the near future.

Rates of fares in Muskegon are: Buses, 5 cents; street car, 10 cents cash or four tokens for 30 cents, with a 6-cent fare for school children.

Recent Bus Developments

Bus Growth Considered

Massachusetts board discusses expansion of these lines. Has new classification of accounts in preparation for such carriers

THE Massachusetts Department of Public Utilities, the state regulatory body, has decided that railroads should not operate short hauls in and out of terminal points, or make too frequent stops, but that such service should be left to the electric railways and the bus lines. This policy the department enunciates in its annual report just sent to the Massachusetts Legislature. It may mean that in the future the department will allow more stations and stops in the Boston suburbs to be discontinued. It has been argued that the short hauls should be left to the Boston Elevated and the Eastern Massachusetts.

Eighty Motor Bus Companies in Massachusetts

On the operations of electric railways during the year the department makes this general report:

We pointed out in our last annual report that there had been a marked increase in the abandonment of electric railway tracks. This tendency has continued during the year covered by this report and electric railways operating lines in country districts and thinly settled areas have continued to abandon street railway tracks and to substitute bus service therefor. The Milford & Uxbridge Street Railway went into the hands of a receiver, was reorganized and then abandoned all its railway tracks, substituting bus service therefor. The Middlesex & Boston Street Railway has continued to abandon electric railway service, substituting buses therefor. During the year this company abandoned all railway operation in Waltham. The Boston Elevated Railway has established more bus routes as feeders to its main lines. The municipally-owned Norton, Taunton & Attleboro Street Railway has been abandoned and three other companies have gone into the territory formerly served by it, each taking a part thereof to be served by buses.

Regarding the bus lines in the state the department report says:

There are now 89 motor bus companies operating in various sections of the state under certificates granted by the department, including those operated by electric railways and by subsidiaries of railroads.

The department has in preparation a new and more comprehensive classification of accounts and form of return for bus companies under its jurisdiction, which it hopes to make effective in the near future.

During the year the department granted certificates of public convenience and necessity to eleven operators of new bus lines, while 69 additional certificates have been granted to holders of certificates, mainly electric railways, for extensions of bus service. The certificates issued to new licensees, with one exception where transportation had previously been rendered by an electric railway, have been for lines wholly local in character and confined to a service within the limits of single municipalities.

Pennsylvania Buys Into Long-Distance P.R.T. Lines

The Pennsylvania Railroad announced on Jan. 21 that plans had been adopted for the complete co-ordination of rail and bus passenger service in the territory served by its system.

The service will be established progressively where need exists or arises either in the public interest or to encourage the continued development of the company's general passenger traffic.

When arrangements are completed under this broad plan, passengers over specified routes may be offered the option of making their journeys partly by rail and partly by bus, using sleeping cars at night and buses for all or part of the daylight hours of the trip.

This will extend to joint rail and bus travel, the same principle which is contemplated in the joint rail and air transcontinental service to be established by the Pennsylvania Railroad and other interests during the coming spring.

As a step prelimiary to putting into effect this general plan for the co-ordination of rail and bus service, the Pennsylvania Railroad makes the further announcement that it has acquired a substantial interest in three bus companies operating lines radiating from the city of Philadelphia and its vicinity, and heretofore owned in entirety by the Philadelphia Rapid Transit Company. The companies in question are the following:

Peoples Rapid Transit Company, Inc.—Operating 76 buses and providing service between Philadelphia and New York; Philadelphia and Atlantic City; Philadelphia, Wilmington, Baltimore and Washington; with special excursions to Valley Forge, Buffalo, West Point and other places of interest.

Montgomery Bus Company — Operating seventeen buses and providing service between Philadelphia (at 63rd and Lancaster Avenue), Rosemont and Garrett Hill, via Lancaster Pike; Ardmore and Gladwyne; Rosemont, Wayne and Strafford.

Philadelphia Suburban Transit Company, Inc.—Operating thirteen buses and providing service between Philadelphia (at 63rd Street and Lancaster Avenue), Ardmore and Bryn Mawr, via Montgomery Pike.

Acquisition of shares in these lines, and establishment of working relations with them, follows the incorporation last September of the Pennsylvania Railroad's subsidiary, the Pennsylvania General Transit Company, which has applications for certificates of public convenience in various counties of Pennsylvania pending before the State Public Service Commission.

De Luxe Express Route in Jacksonville

Jacksonville witnessed the inauguration of a de luxe express bus route with four Twin coaches between Murray Hill, Avondale and the downtown business district on Jan. 14, as a manifestation of the desire of the Jacksonville Traction Company generally to improve and increase service throughout the city. The service brings Murray Hill closer to Jacksonville. It gives a part of Avondale transportation service for the first time.

The fare is 10 cents or a token and 3 cents. The weekly pass and the school tickets are not accepted. Passengers riding in buses may transfer to any car line in the downtown section except the Murray Hill car line. Passengers commencing their trip on a street car and desiring to transfer to the bus line pay a 10-cent fare on the trolley and ask for a transfer to the bus line at the time the fair is paid. A specially designated transfer is issued to those transferring to the bus line to avoid confusion. This transfer must be issued when the fare is paid.

Transfers are accepted on the bus at Laura and Forsyth Streets, Broad and Adams Streets, and the Union Depot. Persons living in Murray Hill, who desire to use the weekly pass, tokens or school tickets, may board the bus in Murray Hill and transfer to the Murray Hill car line at the end of the car line. Persons leaving the city on a weekly pass, tokens or school tickets for Murray Hill may transfer to the bus at the end of the car line.

Buffalo Line Approved

A certificate was granted by the Public Service Commission on Jan. 17 to the International Bus Corporation for the operation of a bus line in Kensington Avenue, Buffalo, between Bailey Avenue and the east city line. The new line will be operated in connection with the Bailey Avenue bus line and the International Railway's cars. The recent action of the commission is in response to demands for service. The city consented to operation of the bus line on Nov. 12, 1928.

Rights Approved for Geneva Railway Bus Lines

The Public Service Commission of New York has granted a certificate to the Geneva Railway Bus Lines, Inc., for the operation of a bus line between Geneva and Seneca Falls, passing through Waterloo and the towns of Waterloo and Seneca Falls, with a branch line from Geneva along Seneca Lake to the Geneva-Seneca Falls highway.

The bus line will serve territory formerly transversed by the railway connecting Geneva, Seneca Falls and Auburn, now discontinued. Evidence submitted at the hearing showed that operation by the buses resulted in a 68 per cent increase in passengers over the number carried in the cars of the railway company.

Buses will operate on practically the same schedule as the railway with more frequent trips if necessary. The same fare will be charged.

Favors Substitution on Berkshire Line

No definite opposition to the Berkshire Street Railway's petition for authority to substitute buses for electric cars, where it may seem necessary to reduce operation costs on its 90-mile system, was voiced at the hearing on the proposal held by the Massachusetts State Public Utilities Commission in Boston on Jan. 17. Representatives Sisson of Pittsfield and Akeroyd of Lanesboro spoke in favor of the petition.

C. Q. Richmond, manager, said that the company formerly did a gross business up to $1,200,000 annually, but last year it was less than $700,000. He said the company had succeeded in paying taxes and meeting operating expenses, but had been obliged to suspend dividends. The plan would avoid the necessity of obtaining separate franchises for bus lines from the various cities and towns served.

New Service Planned in Bethlehem

The Bethlehem Transit Company, a 6-mile line, which carried people from Center Valley and intermediate points into the city of Bethlehem, Pa., to their work, has been dissolved. The climax came recently, when the Mayor and City Council ordered the company to repair its roadbed within the city of Bethlehem, because of danger to automobile transportation. In some places the tracks extended several inches above street level. Upon failure of the company to comply with the order, the city sent a squad of workmen to the tracks where, guarded by platoons of police, the offending rails were torn up. This in itself sealed the eventual fate of the organization.

Patronage on the line, which extends principally into the rural sections, has been steadily falling off. Yet there is a considerable amount of passenger traffic at certain hours.

Coincident with the announcement that the line was disbanded, the Lehigh Valley Transportation Company, the bus line subsidiary of the Lehigh Valley Transit Company, promised that the route formerly covered by the Bethlehem line would be served with the company's buses.

The bus proposition was advanced by H. F. Dicke, vice-president of the Lehigh Valley Transportation Company, which is dickering with the Bethlehem Chamber of Commerce to stand any loss under $10,000 which the organization might sustain in the first year of its operation.

Gasoline Tax Bill in New York

A second gasoline tax bill was introduced in the Assembly on Jan. 14 by Louis A. Cuvillier, Democrat of New York, imposing a tax of 2 cents a gallon of motor fuel. The bill contains the section providing for refunds of tax, and/or exemptions in the payment of tax for purchase of gasoline not intended for motor fuel use. Under the Cuvillier bill the state would retain 10 per cent of the total amount of tax collected.

The receiver of taxes of the city of New York would receive 50 per cent of the amount of tax collected in New York City, such moneys to be used to reduce taxes, while the residue would be distributed to the county treasurers of the various counties in the proportion that their total road mileage outside of cities and incorporated villages bears to the total road mileage of the state.

Agitation for All Buses on Broadway, Louisville

Whether or not street cars on Broadway shall be replaced by buses is a problem before city officials and officers of the Louisville Railway, Louisville, Ky. Elimination of cars was suggested in a report of the Jefferson County Grand Jury, following an inspection of safety zones, or concrete monument type standards, on Broadway. Railway officials contend that installing enough buses to care for Broadway traffic would entail further outlay that probably would result in a 15-cent fare.

At present street cars are used on Broadway only for express service through the street and buses make the local stops in a combination service, which has proved very satisfactory. One opinion is that neither the street cars nor the buses are at fault, but merely the motorists, or perhaps the city in not having the loading stations properly marked. In fact, the loading station had proved so practical that the board of safety recently went over plans for installing many more of them.

James P. Barnes, president of the railway, contends that a move to eliminate the cars, if carried into effect, would be merely a burden on the public, and cites the financial costs. He also held that to move all traffic by bus on Broadway would add to the unit cost more than that of trams. He said:

If there is a traffic problem on Broadway it is not caused by street cars or buses. More than one-third of the passengers hauled over Broadway each day are by street car. A traffic survey showed Broadway at peak hours to be only partially filled with street cars, buses, automobiles, etc., that is, from a capacity standpoint. This does not represent congestion.

Arthur A. Will, former Mayor of the city, and now chairman of the board of safety, favors the elimination of street cars. Sharing the view of others he has the idea that Louisville should have a Fifth Avenue, like New York, or a Michigan Boulevard, like Chicago.

Financial *and* Corporate

No Extension of Piedmont & Northern Railway

The petition of the Piedmont & Northern Railway to have the adverse order of the Interstate Commerce Commission on a proposed extension of its lines set aside has been dismissed by a special court formed to hear the case, in an opinion filed at Greenville, S. C., by Clerk D. C. Durham, of the Federal Court of Western South Carolina.

The opinion of the court was written by Judge Morris A. Soper, United States district judge at Baltimore, and concurred in by Judge Elliott Northcott, member of the Circuit Court of Appeals at Richmond, and Judge Edmund Waddill, Jr., senior circuit court judge of the Circuit Court of Appeals at Richmond.

The Piedmont & Northern is seeking permission to extend its lines. This permission was denied by the Commerce Commission on the grounds that the proposed new line paralleled the Southern Railway and that the territory it is proposed to serve is adequately served.

The Piedmont & Northern is an electric railway owned by the Duke interests. The company's lines run from Greenwood, S. C., to Spartanburg, S. C., and from Gastonia, N. C., to Charlotte, N. C., with some minor branches. The proposal is to link up the existing track and to extend the line from Charlotte to Winston-Salem, N. C., giving a continuous line of approximately 250 miles.

The railway claims that the Commerce Commission is without jurisdiction because of the interurban character of the road and also because the project, it is alleged, was begun before the regulatory body was given jurisdiction in such cases.

The Southern Railway and most of the other steam railroads that operate in North Carolina opposed the proposed extension.

It has since been learned that the railway will appeal its case against the Interstate Commerce Commission to the United States Supreme Court.

City Offers $604,463 for California Cable Line

City Engineer M. M. O'Shaughnessy, of San Francisco, Cal., has estimated that all the city can afford to pay for the parts of the California Street Railroad Cable Company's property it can use is $604,463. This estimate the city engineer made public on Jan. 9 at a conference of city and cable company officials at the City Hall. The conference was called to discuss measures for taking over the cable company properties, franchises on parts of which expire next month. Herman Pfleger, representing the company, said:

If that is an offer we can tell you right now we won't accept it. It's not enough by a long way.

The parts of the system the city contemplates merging with its municipal lines are the California Street and Hyde Street trackage. It does not want the O'Farrell Street line.

Mr. O'Shaughnessy said it would cost $1,762,000 for the city to produce new the parts it wants and that the depreciated value of these parts is about $903,704.

The whole cable system new would cost $2,252,458, he said, and its depreciated value would be $1,097,404.

The figure of $604,463 quoted by the City Engineer as "all the city can afford for the parts it wants," means, he said, the figure at which the city could operate on a 5-cent fare, make a reasonable profit and retire bonds after 25 years.

Attorney Pfleger assured the conference that even though franchises expire there will be no interruption of service until some agreement is reached.

Bankers Discuss Baltimore Situation

SECURITIES of the United Railways & Electric Company, Baltimore, Md., exhibit little change in quotation and a minimum of public interest. Until the litigation affecting the future of this corporation approaches nearer to a conclusion or, more desirably, the earnings exhibit a definite rising tendency, there is likely to be little activity in these issues notwithstanding the low prices at which they are now quoted.

The Public Service Commission of Maryland, in its reply to the company's court proceedings, is reported to have said that it considered the fare permitted as adequate, on the ground that the authorized fare is all that the service is worth. Surely this is unusual logic with which to answer forcible argument.

A public service corporation must be compensated with adequate return upon invested capital and its credit maintained; otherwise, the service eventually ceases, to the discomfort and inconvenience of the public. It sounds like the ridiculous assertion that no hat is worth more than $3, therefore the sale of hats at a higher price should be prohibited. Our street car service is no luxury, it is a vital necessity. Destroy it and any other class of service which would essay to take its place will be considerably more costly to rider and taxpayer alike.—*Nelson, Cook & Company.*

$17,500,000 Value Placed on Nashville Property

Fixing the valuation of the property of the Nashville Railway & Light Company, Nashville, Tenn., at $17,500,000 with a total valuation of depreciable property of $13,950,000 as of June 30, 1926, as a basis for computing the rate of return, the State Railroad & Public Utilities Commission has ordered the company to operate the railway and electric divisions as joint property and compute the rates from the net results of this joint operation.

The valuation of the combined property of the company on the basis of reproduction cost less depreciation as of June 30, 1926, was placed at $23,083,706, according to a report submitted at the hearing in August, 1927, by William J. Hagenah, Chicago, engineer who represented the company. An audit of the company's books showed the railway division was not at the date of the report on June 30, 1926, earning a reasonable return on the investment in railway property and the deficit had to be made up by the return from the light and power department. It was pointed out at the hearing held in August, 1927, that in one other instance when the railway fare of another company had been increased by the order of the commission, there had been no corresponding increase in earnings.

Elements such as the historic cost, original cost, reproduction cost and the power of the commission to fix such rates as will give an adequate return, coupled with the ability of the utility to collect such rates and make an adequate return, were considered by the commission before giving its opinion and order.

The opinion of the commission regarding the valuation of the property was rendered as the result of a petititon filed by the Railway & Light Company on March 20, 1926, in which the company asked for a revaluation of its property. The commission, acting upon the request made in the petition, appointed Albert S. Richey, Worcester, Mass., to represent the commission in making an inventory, and the Railway & Light Company appointed William J. Hagenah, of Chicago, to represent the company.

Under the direction of these two engineers, a complete appraisal of the company's property was made and a report presented at a hearing held on Aug. 8, 1927. Because of the large amount of detailed work necessary in its preparation, more than a year was required to compile the report in a form to be presented to the commission.

Final Accounting for Two Massachusetts Roads

Judge Wait of the Supreme Court has ordered a distribution of the money remaining in the hands of Walter Adams, receiver of the Milford & Uxbridge Street Railway and the Millford, Holliston & Framingham Street

Railway, Framingham, Mass. This ends the litigation over the affairs of these companies, before the courts since July 28, 1926, when the American Trust Company and the Old Colony Trust Company, Boston, Mass., as trustees for bondholders, filed bills in equity to foreclose mortgages on the properties to secure payment on the bonds.

Judge Wait's final decree provides for the payment of $47,846 to the Old Colony Trust Company for the bondholders of the Milford & Uxbridge line and $38,756 to the American Trust Company for bondholders of the Milford Holliston & Framingham Company. There are $335,000 of bonds of the Milford & Uxbridge and $165,000 of bonds of the Milford, Hollister & Framingham outstanding.

The two companies were formerly controlled by the Boston & Worcester Street Railway. They are now operated by a new company, namely: the Milford, Framingham, Hopedale & Uxbridge Street Railway, which acquired the lines at foreclosure.

Lower Net on Brooklyn City

For the six months' period ended Dec. 30, 1928, passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $5,580,706 against $5,638,188. Operating expenses and taxes increased from $4,942,424 for the 1927 period to $4,966,154 for the six months ended December, 1928. There was a falling off in the net corporate income, which was $509,475 in the 1928 period and $558,381 in the 1927 period.

Passenger Record in Cincinnati

Revenues of the Cincinnati Street Railway, Cincinnati, Ohio, fell off during the latter part of December, but this was offset by a reduction in operating expense. This falling off was due to the fact that the number of revenue passengers carried in the month was 8,668,601 as against 8,831,609 in the corresponding month of last year. The number of revenue passengers carried in the year 1928 was 102,349,759, against 100,822,449 in the year 1927, or an increase of 1,527,310. The figures follow:

RESULTS IN CINCINNATI IN DECEMBER

Operating revenue	$743,897
Operating expenses	519,175
Net operating revenue	$224,721
Taxes	47,263
Operating income	$177,458
Non-operating income	2,108
Gross income	$179,567
Rental, interest, sinking fund and return on capital	171,584
Surplus	$7,982
Total in fare control fund—	
Nov. 30, 1928	$448,004
Dec. 31, 1928	455,986
Revenue passengers	8,668,601
Transfer passengers	2,637,314
Free passengers	117,991
Total passengers carried	11,423,906

John E. Zimmerman on New Jersey Board

John E. Zimmerman, chairman of the executive committee of the United Gas Improvement Company and acting president of that company, has been elected a director of the Public Service Corporation of New Jersey, to succeed Arthur W. Thompson, who has resigned from that board as well as from the office of president and director of the United Gas Improvement Company. Mr. Zimmerman has also been elected to succeed Mr. Thompson on the boards of the various underlying companies, and has been elected to the executive committee of the New Jersey corporation.

Expansion by Ohio Utility

Two new public utilities, one in Ohio and one in Hawaii, are soon to be added to the holdings of the Utilities Service Company at Alliance, Ohio, of which E. W. Sweezy, vice-president of the Stark Electric Railroad, is president. The estimated cost of the two new companies is $9,000,000. Mr. Sweezy, accompanied by Former Judge George H. Clark of Canton, Ohio, his legal advisor, sailed on Jan. 26 from San Francisco, Cal., for Hilo, Hawaii, to complete negotiations for the purchase of the hydro-electric plant located at Hilo, the second largest town in Hawaii with a population of about 15,000 persons. This plant is serving 6,000 customers.

Mr. Sweezy expects to return from the Hawaiian trip about Feb. 20, and upon his return will complete negotiations for taking over the Northern Ohio Telephone Company, which adds another link in the already long chain of Ohio utilities controlled by the Utilities Service Company.

Organized less than a year ago, shortly after the purchase of the Suburban Light & Power Company of Cleveland by Mr. Sweezy, the Utilities Service Company at the present time owns and controls more than half a hundred Ohio utility companies with estimated valuation in excess of $18,000,000, of which the Stark Electric Railroad, a branch 35 miles long between Canton and Salem, is a part. Utilities now controlled by the Utilities Service Company include ice plants in five large Ohio cities—Toledo, Springfield, Youngstown, Canton and Massillon—several power lines and a network of telephone systems.

Working Out a Plan for Springfield

The exact nature of plans now under consideration by officials and the receiver of the Springfield Railway, Springfield, Ohio, are not ready for public announcement, but according to Julius Theobald, manager, plans are under way which are presumed to include reorganization of the lines with the idea of augmenting the railway service with buses, as suggested by Willitts H. Sawyer, receiver, ,when he took over the lines last summer. These plans have been made more definite since the City Commission recently suggested competitive proposals for supplying transportation. A time limit for these proposals was set for Feb. 1.

Conspectus of Indexes for January, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Jan. 1929 7.71	Dec. 1928 7.71	Jan. 1928 7.59	Jan. 1929 7.71	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	Jan. 1929 145.3	Dec. 1928 145.5	Jan. 1928 140.6	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	Jan. 1929 229.9	Dec. 1928 229.8	Jan. 1928 238.6	Jan. 1929 229.9	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Jan. 1929 204.5	Dec. 1928 205.1	Jan. 1928 200.9	March 1924 206.8	Sept. 1927 199.4
Eng. News-Record Construction Cost (General) 1913 = 100	Jan. 1929 209.4	Dec. 1928 210.2	Jan. 1928 203.9	March 1924 224.7	Nov. 1927 202.6
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Dec. 1928 96.7	Nov. 1928 96.7	Dec. 1927 96.8	Dec. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	Jan. 1929 12.96	Dec. 1928 13.15	Jan. 1928 13.57	Dec. 1925 14.41	July 1924 12.22
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Dec. 1928 155.8	Nov. 1928 157.3	Dec. 1927 155.9	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Dec. 1928 162.1	Nov. 1928 162.6	Dec. 1927 163.6	Nov. 1925 171.8	April 1928 160.8
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Dec. 1928 127.3	Nov. 1928 135.0	Dec. 1927 109.8	Nov. 1928 135.0	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	Dec. 1928 106.6	Nov. 1928 104.0	Dec. 1927 96.8	May 1928 108.4	May 1924 84.4
Business Failures Number	Dec. 1928 1670	Nov. 1928 1568	Dec. 1927 1820	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	46.55	54.23	51.64	122.95	22.11

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Personal Items

B. R. Chestney in Charge at Macon

With the consolidation of the Macon utilities with the Georgia Power Company on Dec. 1, 1928, referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 29, 1928, B. R. Chestney was made division manager of the Macon division of the latter company.

Mr. Chestney has been identified with the property at Macon since 1917 when he was made engineer maintenance of way of the Macon Railway & Light Company. In 1924 he was put in charge of operation of the railway system, serving in these capacities until 1928. Upon the resignation in 1928 of



B. R. Chestney

L. A. Magraw, vice-president and general manager of the Macon utilities, to accept a similar position with the South Carolina Power Company in Charleston, Mr. Chestney succeeded him in the management of the Macon companies.

Since leaving Georgia Tech in 1906, Mr. Chestney has been adding to a storehouse of valuable experience. As a starter, practical pointers were obtained when he served as a topographer and transit man on a railroad survey from Leon in the State of Juanoguato to Vera Cruz, Mexico. In 1907, he returned to Georgia and accepted a position as a topographer and draftsman for the Atlanta, Griffin & Macon Electric Railway, making surveys of a proposed interurban railway. This project being abandoned, he went to work in June, 1908, on preliminary surveys and investigations of the Lloyd Shoals hydro-electric plant for the Bibb Power Company, a predecessor company to the Central Georgia Power Company. This was his first connection with the companies with which he has since been employed. In 1910 he took up the work of running surveys for transmission lines for the Central Georgia Power Company and supervised the construction of the line from the Lloyd Shoals dam to Macon. He also was in charge of the construction of the line from Bibb to Griffin, and in 1912 was in charge of the construction of the line from Griffin to Atlanta, securing all of the rights-of-way into Atlanta.

In 1913 he was transferred from field construction work into the Macon offices of the Central Georgia Power Company with the title of general engineer, and in 1916 he was made chief engineer of that company.

Mr. Chestney was born in Macon on June 13, 1885. He attended the Macon grammar and high schools and entered Georgia School of Technology in 1901. He is an associate member of the American Society of Civil Engineers. He is also a member and has held important committee appointments in the National Electric Light and the American Electric Railway Association.

L. Wingerter Succeeds Miss Hanlan at Gary

Margaret K. Hanlan, for the past five years assistant publicity director of the Gary Railways, Gary, Ind., has resigned to accept the post of advertising manager of the Public Service Company of Oklahoma at Tulsa, Okla. While associated with the Gary Railways, Miss Hanlan enjoyed the distinction of being one of the very few women in the United States engaged in publicity work for a street railway.

Lawrence Wingerter, formerly connected with the advertising department of the Westinghouse Electric & Manufacturing Company, is Miss Hanlan's successor.

W. E. Wood of Richmond Honored

William E. Wood, president of the Virginia Electric & Power Company, Richmond, Va., was elected vice-president of the Engineers Public Service Company at the board of directors meeting in New York on Jan. 24. Engineers Public Service controls the Richmond property.

Arthur P. Russell Executive Vice-President of New Haven

Directors of the New York, New Haven & Hartford Railroad on Jan. 22 announced the election of Arthur P. Russell of Hingham, Mass., as executive vice-president of the New Haven system. Mr. Russell has been vice-president since March 1, 1920. His headquarters will continue to be in Boston, but he will maintain an office at New Haven.

Mr. Russell will continue as president of the New England Transportation Company, the motor coach subsidiary of the New Haven. He also will represent the company in all matters in Massachusetts and Rhode Island.

R. R. Hadsell General Manager at Schenectady

Promotion of Roy R. Hadsell, general superintendent of transportation New York State Railways, to general manager of the Schenectady Railway, was announced in Rochester recently by James F. Hamilton, president of both railway systems. Mr. Hadsell, who assumes his new duties Jan. 14, succeeds James H. Hustis, president and general manager of the Schenectady lines prior to their recent acquisition by Ellis L. Phillips of New York and associates who also control the New York State Railways.

Mr. Hadsell had supervision over all electric railway and bus lines in Rochester, Syracuse and Utica, besides the interurban routes controlled by the company. He began service in Rochester with the New York State Railways in 1917. Like President Hamilton, Mr.



R. R. Hadsell

Hadsell entered the electric railway field as a conductor on the Buffalo lines in 1899. He went to Schenectady in 1902 as cashier and became superintendent of the United Traction Company in 1913 with offices at North Troy. He left this post in 1917 to become assistant superintendent of the New York State Railways, Rochester lines. A year later he was elevated to superintendent at Rochester and six years later became general superintendent of the entire system.

Mr. Hadsell, whose home and headquarters have been in Rochester, has been active in community and civic work, being a past-president of the Safety Council of the Chamber of Commerce and a leader in the New Industries Bureau movement of the Chamber. He is popular socially, being a member of the Rochester Club and the Monroe Country Club. Golf is his favorite recreation.

H. L. Mitchell Continues as West Penn President

At the meeting of the board of directors of the West Penn Power Company held recently in New York, Harry L. Mitchell, Pittsburgh, was elected president, succeeding G. M. Gadsby, resigned. Mr. Mitchell has been identified with West Penn oper-

ations for more than 25 years. He has been president of the West Penn Railways since 1927 and will continue in that capacity.

A. W. Thompson Leaves U.G.I.

Arthur W. Thompson has presented to the executive committee his resignation as president of the United Gas Improvement Company. It was written on the eve of Mr. Thompson's departure from New York on Jan. 20 with his family on the White Star liner *Laurentic*.

An announcement explained that Mr. Thompson's action was taken "on the ground that his continued ill health does not warrant his again undertaking the arduous duties which the administration of the office involves."

A successor to Mr. Thompson, it was said, will not be considered for the present, but the executive function will continue to be exercised by John E. Zimmerman, chairman of the executive committee.

Mr. Thompson went to the United Gas Improvement Company as president in July, 1926. He has previously been president of the Philadelphia Company, which operates the Duquesne Light Company, serving electric light and power; Equitable Gas, furnishing natural gas; Pittsburgh Railways, operating the railway system, and the Allegheny County Steam Heating Company, which provides steam for heating.

He did much to work out the plan for the reorganization of the Pittsburgh Railways and the lifting of the receivership there, and played no small part in the rehabilitation of that property, which resulted in its being selected to receive the Coffin Award in 1925, and it was Mr. Thompson who personally accepted the award at the Atlantic City Convention of the A.E.R.A., in behalf of the company, its employees, and the city.

His training as an engineer, educator, railroad executive, and federal executive gave him the perspective, experience and judgment adequately to plan for the needs of one of the greatest industrial regions of the country, and the policies followed while he directed the work of the utilities in that district and adhered to since his resignation from the company there give complete evidence of the value of his time and efforts.

The resignation of Mr. Thompson as president of the U.G.I., was accepted on Jan. 23, but no action was taken to fill the vacancy. Mr. Thompson also resigned as chairman of the boards of the Philadelphia Electric Company, the Philadelphia Electric Power Company and the Susquehanna Power Company, all subsidiaries of U.G.I. In the three chairmanships, John E. Zimmerman, chairman of the executive committee of the U.G.I., was elected as his successor. Mr. Zimmerman also succeeded Mr. Thompson as a director of the Public Service Corporation of New Jersey.



Edward Anderson

Edward Anderson Succeeds A. W. McLimont in Winnipeg

At the meetings of the boards of directors of the Winnipeg Electric Company, Winnipeg, Canada, Manitoba Power Company, Ltd., Northwestern Power Company, Ltd., and associated companies, held on Jan. 9, the resignation of A. W. McLimont as director, president and general manager, was accepted and Edward Anderson, K.C., general counsel for the companies, was elected a director and appointed president and general manager to succeed Mr. McLimont. Mr. McLimont's decision was advised by physicians who suggested that he be relieved of his responsibilities and as soon as possible take a long rest and vacation of possibly a year's duration.

Emulating the sucessful example of the Canadian Pacific Railway, the Winnipeg Electric Company has appointed an eminent lawyer to occupy the presidential chair of the company and its subsidiaries, in the person of Edwerd Anderson, K.C.

During the twenty years that Mr. Anderson has been connected with the Winnipeg Electric Company he has actively participated in the many important developments promoted by the company in that period, and he steps into office at the commencement of the greatest development the company has yet undertaken—the construction of the 225,000-hp. hydro-electric plant at Seven Sisters Falls on the Winipeg River.



A. W. McLimont

Mr. Anderson is, to all intents and purposes, a Manitoba product, having left his birthplace, Dorchester, Quebec, in 1879 at the age of twelve to make his new home in Portage la Prairie. After attending the public schools he was graduated from Manitoba University and was called to the Manitoba Bar in 1889. For several years he was crown prosecutor at Portage la Prairie and in 1906 became associated in Winnipeg with the legal firm of Moran, Anderson & Guy. In 1909 he was made a K.C. and during the same year became asociated with the legal department of the Winnipeg Electric Company. He has served as president of both the Manitoba Bar Association and the Manitoba Law Society and has taken an active interest in public affairs generally.

The selection of Mr. Anderson as president and general manager of the widespread Winnipeg Electric enterprise is a very popular choice.

Mr. McLimont's career in public utility enterprises has covered assignments both in North and South America. His service record at Winnipeg started in 1917 when he took over the active management of the company. Later he became vice-president and in 1926 was made president. Among the important executive positions he has held might be mentioned—general manager of the Dubuque Light & Traction Company, Dubuque, Iowa; transportation engineer of the Public Service Commission for the First District of New York; general manager of the Chicago & Milwaukee Electric Railway; vice-president and general manager of the Michigan United Railways; vice-president and general manager of San Francisco-Oakland Terminal Railways, now the Key System Transit Company; and vice-president and general manager of the Georgia Power Company.

A few years ago Mr. McLimont's utility accomplishments in Winnipeg were reviewed in the *Financial Post*. He was lauded for restoring the credit of the company which, when he took it over, "was the favorite hate of disappointed citizens."

Mr. McLimont was born in Quebec City and is a member of one of the oldest of Canadian families.

At its meeting on Jan. 9 the board issued a statement in part as follows:

> The board wishes to express its appreciation of Mr. McLimont's outstanding services to Winnipeg Electric Company, Manitoba Power Company, Ltd., and associated companies during the past eleven years. His ability and the results of his efforts are too well known in Greater Winnipeg and, in fact, throughout Canada, to require laudation at this time.
>
> In appointing Mr. Anderson to succeed Mr. McLimont, the board does so with the knowledge that the affairs of the companies will be directed by one thoroughly familiar with the business of the company and with local conditions and that the personnel of the companies' organization are and will continue to be definitely behind him in the effort to insure a continuance of reliable service to the community.

Obituary

James J. Doyle

James J. Doyle, president of the Washington, Baltimore & Annapolis Electric Railroad, with headquarters in Baltimore, died on Jan. 19 of heart disease.

In 1907, when the Washington, Baltimore & Annapolis Electric Railroad was being constructed, Mr. Doyle became connected with the company as a construction expert. He remained with the company after the road was built, filling the position of superintendent of track and overhead. He was made general superintendent in 1909. In 1911 he succeeded John N. Shannahan as vice-president and general manager.

Shortly before the Baltimore property was purchased by the Consolidated Gas & Electric Company, Baltimore, in 1926, Mr. Doyle was made president of the railroad. In addition to heading the railroad Mr. Doyle also was president of the Annapolis & Chesapeake Bay Power Company, a subsidiary of the railroad, which was taken over by the Consolidated at the same time the railroad was purchased.

Mr. Doyle was 53 years old. He was a native of Cleveland. After attending the public schools of that city he became connected with the Pennsylvania Railroad. In 1899 he joined the Eastern Ohio Traction Company as a construction engineer and assisted in building that railway.

W. O. Wood

William O. Wood, well known in the public utility field and recently vice-president of the Waterbury Cable Service, Inc., of New York and Chicago, died at his home in Jackson Heights, Long Island City, on Jan. 21.

"Bill" Wood, as he was generally known, was a former president of the New York Electric Railway Association. He was one of a group of officials brought out of the West by Col. E. W. Winter, when the rehabilitation of the Brooklyn Rapid Transit Company was entrusted to the Colonel years ago. Others in the group who threw the weight of their experience into the work of saving the property from receivership at that time were John F. Calderwood, Dow Smith, W. G. Gove, W. S. Menden, A. N. Dutton and J. F. Folds.

Each of these men subsequently made a name for himself, and in the work that was done by them in Brooklyn Mr. Wood played an important part. So much so that it was not long before responsibility for the operation of the entire elevated system of the company devolved upon him. Subsequently he was made assistant general superintendent of the entire property. From that post he went to the New York & Queens County Railway, the position in which he became widely known as an operator and for his unfailing good humor. His activities with this company covered a period of fifteen years, ending with his retirement from the company following its receivership.

For many years before coming to New York Mr. Wood was identified with railroads and electric railways in the Middle West and the South. Following service with the Louisville & Nashville and the Illinois Central Railroad he entered the electric railway field as general superintendent of the Rapid Railway System, comprising the interurban lines of the Detroit United Railway, Detroit, Mich. Subsequently he was superintendent of the rapid transit lines in Brooklyn and later assistant general superintendent with charge of transportation in Brooklyn. For one year he was operating statistician of the Interborough - Metropolitan Company, New York.

Mr. Wood was born in Evansville, Ind., Jan. 8, 1870. After graduating from Evansville High School he obtained employment with the surface lines in Chicago. He was also at one time in his early career secretary to that well-known steam railroad operator, J. T. Harahan.

H. A. Clarke

H. A. Clarke, vice-president of the Penn-Ohio system, which controls the Youngstown Municipal Railway, and a director and officer of various other public utility properties, died in East Orange, N. J., on Jan. 16.

With 25 years' experience in construction management and valuation of public utilities, Mr. Clarke was well known as a financier and valuation expert. He has been identified with the Hestonville, Mantua & Fairmount Passenger Railway, Southwestern Street Railway, Central New York Southern Railroad, and Ithaca Street Railway. He conducted some special investigations for the North American Company and while with Republic Engineers, Inc., he examined reports on utility properties for bankers and took part in appraisals and rate proceedings before commissions of New York, Pensylvania, Ohio, and Vermont.

Mr. Clarke was a graduate of Central Manual Training School, Philadelphia, Pa., where he took a special course in electrical engineering.

T. H. Miller, 95, the oldest employee of the Nashville Railway & Light Company, Nashville, Tenn., died recently. An unusual feature of Mr. Miller's service record was that he was 70 years old before he became affiliated with the company and then lived to become a member and a faithful attendant at the meetings of the Twenty-Year Club.

E. A. Batwell

Edward A. Batwell, for many years publicity director of the Puget Sound Power & Light Company and its affiliated organizations, died on Jan. 13 at his home near Seattle, Wash., ending a long career spent in newspaper, dramatic and architectural accomplishments. Mr. Batwell was born in Michigan eleven months before the outbreak of the Civil War. He was graduated from the University of Michigan in 1884 with an architectural degree, and the early years of his business career were spent in the creative work of that craft. Attracted to Port Townsend, Wash., during the boom period in the late '90's he was responsible for the design of many of the business structures erected in that city as well as in Victoria, B. C.

With the collapse of the building boom in the Northwest he returned to the East and organized a theatrical booking agency which handled many shows traveling out of Chicago. The West called him again and in 1904 he established his permanent home in Seattle, where he engaged in dramatic criticism and general newspaper work. For the last twenty years "Bat," as he was known to hundreds of his friends, had been in charge of the publicity work for the Puget Sound Power & Light Company and had acted as editor of the company's official house organ, the *Puget Sound Electric Journal*. For several months he had been a sufferer from heart disease, which finally proved fatal. A widow and son survive him.

L. A. Mitchell, 71, pioneer street railway developer of Macon, Ga., and a former commissioner of Bibb County, is dead, following a long illness. Coming to Macon early in the 90's, Mr. Mitchell, as an officer of the Metropolitan Street Railway, saw the present line to Bellevue constructed. That company later was merged with the Consolidated Street Railway, and following that merger other railway lines were constructed. A short time later Mr. Mitchell and his associates formed the Athens Street Railway at Athens, Ga. That subsequently was sold, however, to other interests. In recent years Mr. Mitchell had turned his attention to the promotion of a chain of theaters.

Capt. Robert A. Speed, at one time president of the Memphis Gas & Electric Company, Consolidated, Memphis, Tenn., predecessor of the present Memphis Power & Light Company, died recently in that city. Captain Speed had a long and notable career in business of the South. For years he was interested in the ownership of various steamboats on the Mississippi River, and for more than 30 years managed a large company that supplied steamboats with fuel. He was a bank director and for four years commissioner of fire and police in Memphis under Mayor W. L. Clapp. Captain Speed was born in Louisville, Ky., in 1844.

Equipment Market Improves

Orders of track, line and car equipment increase in volume. Safety door controls for Long Island Railroad. Regina to order seven cars. Extension probable in Fresno

INCREASE in the volume of equipment and supplies purchased, particularly as to track and line materials and car equipment has been noted recently. In general, it appears that it is the small railways rather than the large companies which have increased their purchasing activities. According to reports received from numerous railways, there is an upward trend from the recent dormancy in the supply market. At the same time construction projects and new equipment orders continue to be announced, revealing prospects of great activity for the coming season.

According to E. A. Devereaux, superintendent of the Fresno Traction Company, Fresno, Cal., this company may build a new line to serve the northwest section of that city. To date no details are available as to the actual plans made. Another construction on the Pacific Coast is that of the Pacific Northwest Traction Company, Seattle, Wash., which will rebuild its bridge over the Skagit River at Riverside at a cost of $60,000. With the exception of the draw span which is of steel, the entire bridge will be rebuilt. When finished all spans which are now of wood will be of steel construction.

Long Island Railroad Improvements

The Long Island Railroad, New York, N. Y., at a recent meeting of the Transit Commission agreed to the last of four requests made by the commission involving improvements on this company's system. The railroad stated that it is prepared to equip its 970 cars with safety devices intended to prevent train operation while the car doors are opened.

The devices to be installed are of the interlocking type, controlled from each car. It provides for a light signal installed in the motorman's cab as well as lights on the sides of the cars. It is also requested that an addition of an automatic power control be made to this equipment so that the power would be shut off in the event that any door is opened while the trains are in operation. This also was agreed to by the railway. A cut-out switch will be installed to enable discontinuance of safety devices along lines of the road where station platforms are below train platforms.

Another recent hearing gave approval of the railroad's proposal as to the manner by which 111th Street should be carried across the track of the north side division of the railroad in Flushing. The railroad will elevate its tracks with a clearance of 14 ft., thus maintaining the street grade.

The New York Transit Commission also approved plans for the improvement of the Marcy Avenue Station of the Brooklyn Manhattan Transit Company, Brooklyn, N. Y. These plans include extending the station platform to accommodate eight car trains and widening the platform.

Cars for Regina

The Regina City Commissioners, Regina, Saskatchewan, have reported to the City Council on the specifications of the seven new street cars to be purchased by the city this year. It was recommended by the Commissioners and approved by the City Council that cars similar to those obtained by the city last year should be secured this year. It was also recommended that at least three of these cars should be equipped with roller bearings. The cars ordered for the Regina Street Railway last year were obtained from the Canadian Car & Foundry Company.

The Chicago, South Shore & South Bend Railroad, Michigan City, Ind., will build an addition to its general office building at Michigan City to be ready for occupancy about May 1. The addition will enlarge the floor space of the accounting department which now occupies the east wing of the building, by approximately 2,000 sq.ft. P. H. Lorenz & Company has the contract for the construction.

The South Shore Line has also put into service during the past week three new freight connections with steam railroads. Completion of the Monon-Michigan Central Interchange, just west of Michigan City, opened up a 6,000-ft. four-track transfer which has required three months to construct. Both this interchange and that with the New York Central Railroad are electrified for use of the South Shore Line electric locomotives. A light type catenary overhead is employed.

A new despatch freight terminal in the rear of the present passenger station at Illinois and Market Streets, Indianapolis, Ind., has been opened. The terminal will accommodate shipments over the leading railway lines in the central part of the state. The companies using the new facilities are the Terre Haute, Indianapolis & Eastern Traction Company, the Union Traction Company of Indiana, the Interstate Electric Railway and the Indianapolis & Southeastern.

Track Material Orders

Among track material purchases the Louisville Railway, Louisville, Ky., contemplates the purchase of 15,000 white oak ties. This company has also just purchased 5,000 of these ties. Fifteen thousand white oak ties have been purchased by the Twin City Rapid Transit Company, Minneapolis, Minn. This company has ordered 10,000 cedar ties, 14,000 ft. of 3-in. oak bridge planks and 10,000 4½-in. standard granite paving blocks.

The Toronto Transportation Commission, Toronto, Ont., has placed orders for 15,000 standard ties, 550,000 granite blocks, and 250 barrels of quicksetting cement. The Connecticut Company, New Haven, Conn., has ordered 400 rail braces, 250 rail joint plates and three sets of split switch points complete with rail braces, tie plates and ground throw. Ten thousand 6-in. x 8-in. x 8-ft. oak ties and 9,000 creosoted ties have been ordered by the Pittsburgh Railway, Pittsburgh, Pa. This company has also ordered 30 kegs of boat spikes, two carloads of screenings, 65 tanks of acetylene gas, 265 tanks of oxygen gas, 76 drums of Tarmac, twelve carloads of granulated slag, and ten carloads of slag ballast.

The United Electric Railways Company, Providence, R. I., has ordered 1,000 5-ft. 2-in. round tie rods and 1,000 5-ft. 2-in. flat tie rods, 400 grinding bricks, 300 36-in. bonds and 300 46-in. bonds. The company has also ordered two concrete breakers, 75 Corundum wheels, 150 red and yellow flags and 25 gross of 12-in. hacksaw blades. Other track orders by this company include 144 switch brooms, 150 tons of salt, 8 pairs of compromise joint plates, 1,000 lb. of ⅝-in. welding steel, 521 repair parts for Dunham boxes, 300 36-in. cable bonds, 300 lb. magnesium welding rods, 50 heel fasteners and special track work. The Milwaukee Electric Railway & Light Company has ordered 193,000 lb. of salt and 250 ties. One No. 138 Verona eccentric rail bender was ordered by the Capital Traction Company, Washington, D. C.

Line Equipment Purchased

Fifteen miles of copper trolley wire and 5 miles of ¼-in. galvanized strand were ordered by the Louisville Railway, Louisville, Ky. The Toronto Transportation Commission, Toronto, Ont., has placed orders for twelve tons of No. 00 round Phono-electric trolley wire. Two thousand and sixteen feet of 1,000,000 c.m. single-conductor, lead sheath cable has been ordered by the Twin City Rapid Transit Company.

Six cars of poles, two cars of cable and one car of weatherproof wire have been purchased by the Milwaukee Elec-

tric Railway & Light Company, Milwaukee, Wis. The United Electric Railways Company has placed orders for 200 porcelain strain insulators, two miles of No. 00 hard drawn trolley wire, 3,000 ft. of ⅜-in., 7-strand galvanized iron wire, 100 wood strain insulators, 50 right hand frogs and six drawbridge frogs. Other orders placed by this company include 25 adjustable crossings, 5,000 ft. of ⅞-in., 7-strand span wire, 250 lb. of solder and 100 No. 00 splicers.

The Louisville Railways has purchased approximately $40,000 worth of miscellaneous car equipment and supplies. 130 3-in. motor wheels, 230 2-in. motor wheels, 120 6-in. motor wheels and 7,500 brake shoes have been ordered by the Toronto Transportation Commission. The Milwaukee Electric Railway & Light Company has ordered one car of brake shoes.

Among the purchases of car equipment made by the United Electric Railways, Providence, R. I., are 4,000 brake shoes, 1,000 compensating fingers, sixteen journal boxes, 240 101-watt lamps, 20 drums of electric car oil, 1 barrel of dry orange shellac, 1,000 cable straps, 300 lb. of 1½-in. friction tape, 300 yd. of 22-in. duck, 50 pinions, one roll of 32-in. Pantasote, 5 sets of Westinghouse armature coils, 26 boxes of window glass, 1,000 ft. of single braid rubber covered wire, size 20, 5 drums of engine oil, 15 gal. mahogany gloss paint, and 30 gal. white undercoat paint. The Twin City Rapid Transit Company has ordered 1,000 34-in. steel car wheels, 1,000 steel billets and 20 sets of armature coils.

The Pittsburgh Railway Company is remodeling 22 No. 4300 type two-man cars for one-man operation. The Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has ordered three 21-passenger street car type Studebaker buses. The Transit Supply Company, St. Paul, Minn., has received four Mack four-cylinder buses equipped with Eckland bodies. The United Electric Railways Company has ordered eight Twin coaches and the Capital Traction Company has ordered 4 type 2 Yellow coaches. The Louisville Street Railway has ordered two 21-passenger street car type Studebaker buses and the Denver Tramway Corporation has purchased two Mack four-cylinder, 25-passenger buses. The Connecticut Company has ordered six Mack four-cylinder buses and 2 Yellow 24-passenger coaches.

The Northwestern Pacific Railroad, San Francisco, Cal., has been inquiring for a 15-ton overhead traveling crane. It is reported that the Jamestown Street Railway, Jamestown, N. Y., is planning to rebuild part of its car shops which were recently destroyed by fire. The Louisville Railway has purchased $5,000 worth of shop and garage equipment and contemplates the purchase of approximately $20,000 worth of miscellaneous equipment.

The Milwaukee Electric Railway & Light Company contemplates a new terminal at 27th Street and Hopkins Street. Pittsburgh Railways has received 2 Bleeker blacksmith hammers.

Exhibitograph No. 2

BUDGET and PLAN
your exhibit NOW
for the

A.E.R.A. Atlantic City Convention

Sept. 28 to Oct. 4

SPACE
will be charged for at 60 cents per square foot.

Preservative Treatment of Ties Growing

Statistics recently released by the Department of Commerce in co-operation with the Department of Agriculture on tie and pole purchases for the year 1927 show that the steam and electric railroads purchased 103,438,354 crossties and 330,367,000 ft., board measure, of switch and bridge ties, and 3,624,833 wood poles were purchased by the same companies along with electric light and power companies, and commercial telegraph and telephone companies. The statistics do not include purchases by small rural telephone lines having incomes of less than $10,000 per year.

Converting the quantities of switch and bridge ties into crosstie equivalent on the basis of 32 b.ft. per crosstie, the total crosstie equivalent for 1927 is 113,762,323 for the year, an increase of 2.2 per cent over 1925. The number of poles purchased in 1927 is an increase of 10.5 per cent over 1925. No records are available to show how many of these poles were used by electric railways.

Analysis of the poles purchased in 1927 shows that out of the total reported 2,681,545, were treated, or nearly 74 per cent. Subdivision of these poles as to kind of timber would show the cedars leading with nearly 49 per cent, pine following with nearly 31 per cent. The actual figures are as follows:

	Number	Per Cent
Western red cedar	1,140,983	31.48
Northern white cedar	581,492	16.04
Southern white cedar	30,302	.84
Southern red cedar	14,510	.40
Pine	1,120,228	30.90
Chestnut	645,888	17.82
Cypress	35,930	.99
Douglas fir	15,609	.43
All others	39,891	1.10
Total	3,624,833	100.00

The statistics as to crossties are separated so as to show the quantities purchased by the electric railways; and again reducing the bridge and switch ties to a crosstie equivalent on the same basis as above, we find that in 1927 the electric railways purchased a total of 5,076,184 ties, of which 1,227,618, or about 24.2 per cent, were treated. During the same period the steam railroads purchased a total of 113,762,323 ties, of which 21,591,471, or about 18 per cent, were treated. It will be noted that in neither case do the figures show how many ties were treated by the railways.

The statistics of the U. S. Forest Service Bureau show that the total number of ties treated during 1927 was 74,231,840, to which must be added the crosstie equivalent of 5,700,750 ties for switch ties that were treated, or a total of 79,932,190, which does not include bridge ties, of which there is no record. This, however, is nearly 73 per cent of the total; and, while no records are available of the number of ties treated by electric railways, it is doubtful if this would materially affect their percentage figure, certainly not to the same extent as in the case of the steam railroads. However, it is gratifying to note that the electric railways are using creosoted ties to the extent of approximately one quarter of their total requirements, and it is expected that this use of preservative treatment will increase materially as their financial condition improves.

Exhibit Committee Announced

President James P. Barnes of the American Electric Railway Association has announced the personnel of the exhibit committee for the 48th annual convention, scheduled to take place in the new Atlantic City Auditorium, Sept. 28-Oct. 4, inclusive, as follows:

J. H. Hanna, chairman; president Capital Traction Company, Washington, D. C.

T. W. Casey, vice-chairman; president National Pneumatic Company, New York, N. Y.

J. W. Welsh, general secretary A.E.R.A., New York, N. Y.

Frederick C. J. Dell, director of exhibits A.E.R.A., New York, N. Y.

L. G. Avery, manager sales promotion division, The White Company, Cleveland, Ohio.

L. D. Bale, superintendent of power Cleveland Railway, Cleveland, Ohio.

John Bender, secretary and works manager The Bender Body Company, Cleveland, Ohio.

Bertram Berry, eastern sales manager railway sales division, Heywood-Wakefield Company, New York, N. Y.

O. A. Broten, Western manager National Pneumatic Company, Chicago, Ill.

John H. Cain, assistant superintendent Atlantic City & Shore Railroad, Atlantic City, N. J.

Charles C. Castle, vice-president The A. C. F. Motors Company, New York, N. Y.

C. H. Clark, superintendent of way Cleveland Railway, Cleveland, Ohio.

S. J. Cotsworth, sales agent The Lorain Steel Company, Philadelphia, Pa.

C. R. Ellicott, vice-president Westinghouse Traction Brake Company, New York, N. Y.

A. H. England, vice-president and treasurer Electric Service Supplies Company, Philadelphia, Pa.

L. E. Gould, president Economy Electric Devices Company, Chicago, Ill.

R. A. Hauer, vice-president Mack-International Motor Truck Corporation, New York, N. Y.

C. S. Hawley, president and treasurer Consolidated Car-Heating Company, Albany, N. Y.

B. A. Hegeman, Jr., president National Railway Appliance Company, New York, N. Y.

A. P. Jenks, vice-president Cummings Car & Coach Company, Chicago, Ill.

A. L. Kasemeier, vice-president The Cincinnati Car Company, Winton Place, Ohio.

H. J. Kenfield, president and treasurer Kenfield-Davis Publishing Company, Chicago, Ill.

G. L. Kippenberger, vice-president St. Louis Car Company, St. Louis, Mo.

H. E. Listman, vice-president, General Motors Truck Company, Pontiac, Mich.

J. C. McQuiston, advertising manager, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

C. S. MacCalla, vice-president and general manager, the Pennsylvania-Ohio Electric Company, Youngstown, Ohio.

A. L. Price, manager, Ohio Brass Company, Mansfield, Ohio.

A. J. Purinton, general superintendent, Atlantic City & Shore Railroad, Atlantic City, N. J.

Samuel Riddle, vice-president, Louisville Railway, Louisville, Ky.

A. M. Robinson, publicity manager, the J. G. Brill Company, Philadelphia, Pa.

Ross Schram, vice-president, Twin Coach Corporation, Kent, Ohio.

L. W. Shugg, advertising department, General Electric Company, Schenectady, N. Y.

C. W. Stocks, editor, *Bus Transportation*, New York, N. Y.

W. E. Wood, president, Virginia Electric & Power Company, Richmond, Va.

Weekly Business Conditions

The volume of money turnover during the week ended Jan. 19, as reflected by check payments, was smaller than in the preceding week but showed a substantial gain over the corresponding period of 1928, according to the weekly statement of the Department of Commerce. Operations in steel plants showed some curtailment from the previous week but were on a higher level than in the same week of last year. Factory employment in Detroit, indicating activity in the automobile industry, showed substantial expansion as compared with both the previous week and the same week of 1928. The output of crude petroleum, covering the latest reported week, showed further gains over both the previous week and the same period of last year. The production of bituminous coal was also greater than in either prior period.

The general level of wholesale prices was fractionally higher than in the previous week, showing a gain also over the corresponding period of a year ago. Copper prices, though showing no material change from the previous week, were 20 per cent higher than last year. Iron and steel prices showed no change from the previous week but were higher than a year ago.

Loans and discounts of Federal Reserve member banks showed a further contraction from the previous week but were larger than a year ago. Interest rates on both time and call money averaged higher than in either the previous week or the same week of last year. Prices for stocks were higher than in the preceding week. Bond prices, reflecting higher interest rates, were lower than in either the preceding week or the same period a year ago.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	Jan. 22, 1929
Metals—New York	
Copper electrolytic, cents per lb.	16.575
Copper wire, cents per lb.	18.875
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	49.
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4 375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.50
Central, Ill., screenings, Chicago, net tons	0.975
Kansas screenings, Kansas City, net tons	1 70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.75
Weatherproof wire base, N.Y., cents per lb.	19.5
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.5
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.2
Turpentine (bbl. lots), N. Y., per gal	.6575

Weekly Business Indicators

(Weeks ended Saturday. Average 1923–25 = 100)

	1929			1928				1927
	Jan. 19	Jan. 12	Jan. 5	Dec. 29	Jan. 21	Jan. 14	Jan. 7	Dec. 31
Steel operations	109.2	110.5	110.5	107.9	97.0	93.0	88.0	75.0
Bituminous coal production	.....	119.8	101.1	70.7	99.8	111.5	101.1	81.5
Lumber production	.....	96.4	74.5	45.0	101.4	97.3	72.7	57.3
Petroleum production (daily average)	.....	124.5	124.4	123.9	114.3	113.9	114.2	116.2
Detroit employment	.....	127.4	125.9	121.4	99.9	97.8	96.8	92.6
Bldg. contracts 37 states (daily average)	109.6	93.4	64.4	116.7	104.3	109.2	56.2	104.4
Price iron and steel composite	87.5	87.5	87.6	87.5	85.3	85.1	84.7	84.7
Copper, electrolytic, price	.....	119.6	119.6	117.4	100.0	100.0	100.7	100.0
Check payments	141.3	154.8	164.2	119.3	130.0	138.0	154.9	103.4
Bank loans and discounts	129.3	130.9	135.7	131.2	122.6	123.6	125.1	123.5
Interest rates, call money	169.7	154.5	200.0	251.5	97.0	100.0	115.1	133.3
Interest rates, time money	177.1	174.3	182.9	191.4	102.9	97.1	97.1	97.1
Federal reserve ratio	86.5	85.5	79.9	79.5	93.8	91.2	86.7	86.2

Bok Award Jury at Work

The jury for the Harvard Advertising Awards will commence its work on Jan. 31, in the Baker Library of the Harvard Business School where the material is on exhibit. More than twice as many firms have submitted material for this competition as competed last year.

Following are the awards to be made this year: (1) a gold medal for distinguished services to advertising; (2) four prizes of $1,000 each for distinguished individual advertisements, most effective in illustration, in text, in display line and in typography; (3) four prizes of $2,000 each for advertising campaigns, for a national campaign for a specific product, for a local campaign for a specific product or merchandise; for a general or institutional campaign; for a campaign of industrial products.

Winners will be announced at a dinner in their honor at the Harvard Business School, to be held about March 1. It is planned, according to W. B. Donham, dean of the Harvard Business School, to publish a book containing a summary of the five years of the awards, giving full information concerning winning material, as well as reproductions of the advertisements which were awarded prizes.

Harvard Advertising Awards were founded by Edward W. Bok in 1923. Men prominent in the business field are on the committee to pick winners for the fifth annual series of prizes.

Large British Locomotive Order

The Metropolitan-Vickers Electrical Company, Ltd., announces that it has obtained a contract for the supply of 21 electric passenger locomotives, each weighing 100 tons, for the Great Indian Peninsula Railway. Three trial locomotives were originally ordered, two from England and one from the continent of Europe. The present order is the result of trials which have been carried out.

These locomotives are of the 1-6-2 type, there being three driving axles, one four-wheel bogie truck, and one two-wheel pony axle working in conjunction with the nearest driving axle. The motors and their gearing are rigidly mounted on the frame of the locomotive, and transmit the power to the driving axles through a universal motion flexible link drive. All the weight is spring-borne. The normal maximum service speed will not exceed 75 m.p.h., but all parts are designed for 85 m.p.h. The electrical equipment includes six 360-hp. motors and electro-pneumatic control. The pneumatically-operated switches are arranged in a high-tension chamber, while those for the line and main resistances are of single-unit type arranged in groups, and those for the motor combinations and reversing are of the camgroup type.



The "Peacock" Staffless

PEACOCK
STAFFLESS BRAKES

—this time *again!*

on 10 new cars

for Wilmington, Delaware

Once more, we call attention to another "Peacock" Staffless installation. The Delaware Electric Power Company's new cars, built by the J. G. Brill Co., are just as carefully designed and built within, as their appearance is without. And quite in keeping with modern practice, the safety of each car is amply insured by "Peacock" Staffless Brakes.

This is but another link in the long chain of evidence which shows the ultimate economy of specifying the best.



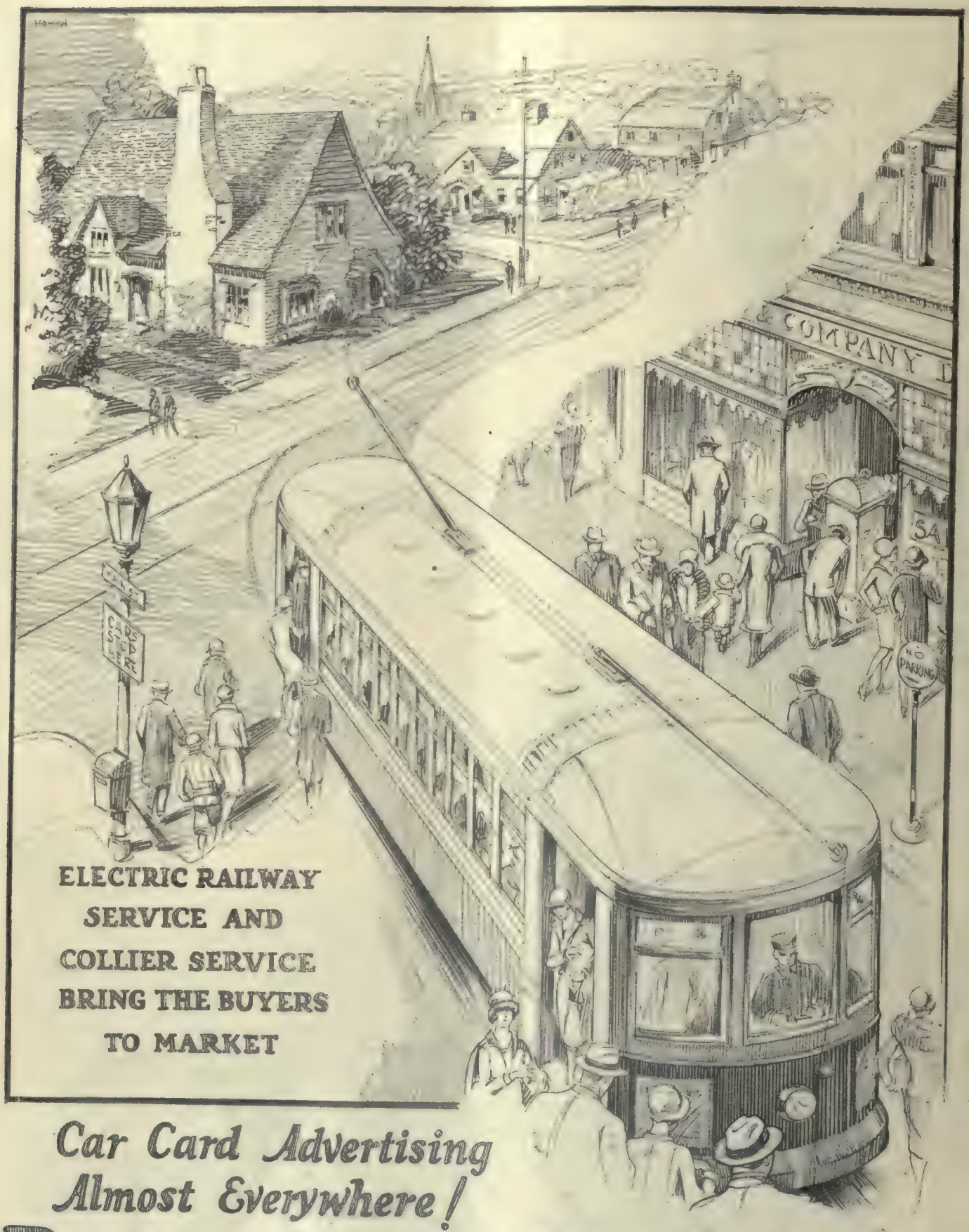


NATIONAL BRAKE COMPANY, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.

General Sales Representatives
The Ellcon Co., 50 Church St., New York



Car Card Advertising Almost Everywhere!

BARRON G. COLLIER

NEW YORK CITY INC.

All-Cord...

one reason for FISK mileage

FISK'S "All-Cord" process, the greatest achievement in tire building, has made Fisk famous for excess *mileage*.

This better construction method, plus perfect balance in every part, gives the Fisk Motor Coach Balloon long life that cuts tire costs to the bone. In addition, the thick, tough Fisk tread insures positive traction and safe braking over any kind of going. Bus operators in every state in the union are getting better tire service, more tire *mileage*, from Fisk Motor Coach Balloons. Try Fisks on the routes that eat up tires. They will save your tire dollars by piling up high *mileage*.

THE FISK TIRE COMPANY, INC.
CHICOPEE FALLS, MASS.



Fisk All-Cord construction does away with internal friction, and insures trouble-free mileage.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
39 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation
Engineers — Constructors
Steam and Hydro-Electric Power Plants, Gas Plants, Steam and Electric Railroads, Transmission Systems, Buildings and Industrial Plants.
43 Exchange Place New York

STONE & WEBSTER
Incorporated
Design and Construction
Examinations Reports Appraisals
Industrial and Public Service Properties
NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION
Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
Appraisals—Management
52 Vanderbilt Ave. New York

SANDERSON & PORTER
ENGINEERS
PUBLIC UTILITIES & INDUSTRIALS
Design Construction Management
Examinations Reports Valuations
CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST
Consulting Engineers
Appraisals Reports Rates Service Investigation
Studies on Financial and Physical Rehabilitation
Reorganization Operation Management
683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

STEVENS & WOOD
Incorporated
Engineers and Constructors
20 Pine Street, New York
Transportation Examinations and Reports

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President
BUCHANAN & LAYNG CORPORATION
Engineering and Management, Construction
Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE: 1004 Citizens National Bank Bldg. — Phone: Hanover: 2142 — NEW YORK: 49 Wall Street

WALTER JACKSON
Consultant on Fares and Motor Buses
The Weekly and Sunday Pass—Differential Fares—Ride Selling
Holbrook Hall 5-W-3
160 Gramatan Ave., Mt. Vernon, N. Y.

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
50 East 42nd St., New York City

McCLELLAN & JUNKERSFELD
Incorporated
ENGINEERING AND CONSTRUCTION
Examinations—Reports—Valuations
Transportation Problems—Power Developments
68 TRINITY PLACE NEW YORK

KELKER, DeLEUW & CO.
CONSULTING ENGINEERS
REPORTS ON
Operating Problems Valuations Traffic Surveys
111 W. Washington Street, Chicago, Ill.

J. ROWLAND BIBBINS
CONSULTING ENGINEER — TRANSPORTATION
Organized Transit Development and Traffic Controls.
Economic Operation, Routing, Schedule Analyses.
Valuations, Rate Cases and Ordinances
EXPERIENCE IN 25 CITIES
2301 Connecticut Avenue Washington, D. C.

E. H. FAILE & CO.
Designers of
Garages— Service Buildings— Terminals
441 LEXINGTON AVE. NEW YORK

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



Our tests determine the best shoe for each type of service

The American Brake Shoe and Foundry Company
30 Church Street, New York 332 So. Michigan Ave., Chicago

NACHOD & UNITED STATES SIGNAL CO. INC.
LOUISVILLE, KY.
BLOCK SIGNALS
FOR
ELECTRIC RAILWAYS
HIGHWAY CROSSING SIGNALS



ROEBLING
Electrical Wires & Cables
John A. Roebling's Sons Co. Trenton, N. J.

Efficient Bus Heating
with
The N-L Venti-Duct Heater
THE NICHOLS-LINTERN CO.
7960 Lorain Ave. Cleveland, Ohio

UNA
RAIL JOINTS
DYNAMOTORS
WELDING ROD
UNA Welding & Bonding Co.
Cleveland, Ohio

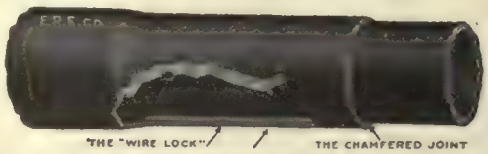
PS HEATERS
Car Heating and Ventilating
—are no longer operating problems. We can show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Heater will save, in addition, 40% to 60% of the cost of any other car heating and ventilating system. Write for details.
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

BELL
NORTHERN WESTERN
CEDAR POLES
BUTT TREATING ALL GRADES TIES
BELL LUMBER & POLE CO., *Minneapolis, Minn.*



Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

ELRECO TUBULAR POLES



COMBINE
Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability
Catalog complete with engineering data sent on request.
ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

RAIL JOINTS
The Rail Joint Company
165 Broadway, New York City

Hale and Kilburn SEATS
Better Quality Seats For Cars and Buses
Hale & Kilburn Co.
1800 Lehigh Ave., Philadelphia, Pa.

RAILWAY UTILITY COMPANY
CAR COMFORT WITH UTILITY
HEATERS
REGULATORS
VENTILATORS
2241-2247 Indiana St. Chicago, Ill.
Write for Catalogue
1328 Broadway New York, N. Y.

EIGHT WORKS
RAMAPO-AJAX-ELLIOT
HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
SUPERIOR, WISCONSIN
LOS ANGELES, CAL.
NIAGARA FALLS, ONT., CANADA
Ramapo Ajax Corporation
RAMAPO AUTOMATIC RETURN SWITCH STANDS AND RACOR DASH POTS FOR PASSING SIDINGS
MANGANESE WORK A SPECIALTY
Sales Office 30 Church St. New York
Also at all works

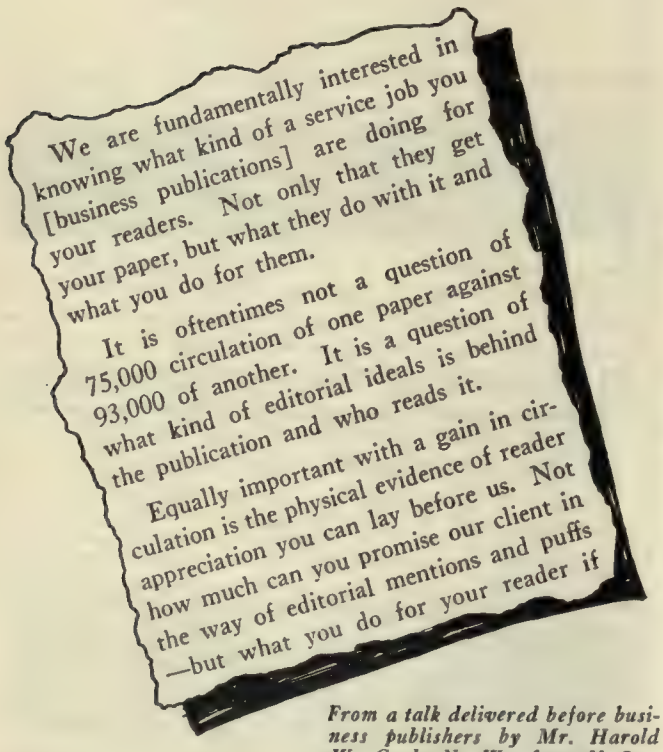
Send for Bulletin No. 2 *describing*
MASTER LIVE LINE TOOLS
Master Pliers, the powerful, unbreakable pliers, cost no more than ordinary types. Send for literature.
MASTER PLIER CORPORATION
7330 Harrison Street Forest Park, Illinois



STUCKI SIDE BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

This is one of a series of McGraw-Hill advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

More and more advertisers are asking this question daily



From a talk delivered before business publishers by Mr. Harold W. Cook, N. W. Ayer & Son.

THIS viewpoint typifies the trend from old "space-buying" methods to careful, behind-the-scenes investigation of advertising mediums . . . a trend that is welcomed by those business publishers who are insistent upon a virile, courageous editorial service to their readers.

This question, "What lies behind your circulation figures?" is easily answered by McGraw-Hill readers. Advertising men have been given a definite answer to this query in the form of a series of advertisements published during 1928, in which is described real editorial service, its objectives and results.

Our advertising agent dug deeply into McGraw-Hill editorial records to help other advertising agents and their industrial clients answer this question.

—The publishers

Reprints of these advertisements will be sent upon request to industrial advertisers, industrial salesmen, advertising agents, bankers and collegiate schools of marketing and advertising.

F-1

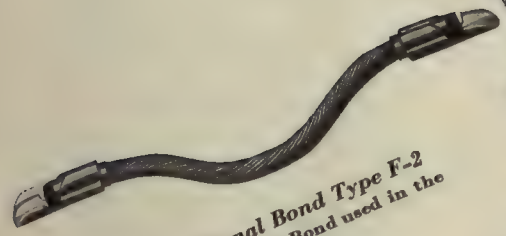
CONGRATULATIONS



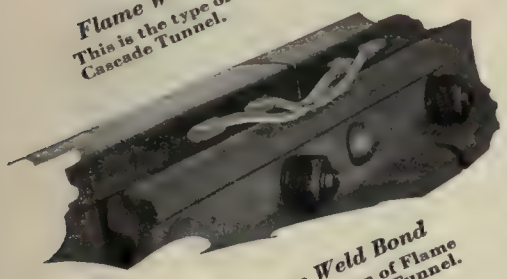
The American Steel and Wire Company wishes to tender a deserved tribute to the Great Northern Railroad and A. Guthrie and Company, contractors, on the successful completion of the Cascade Tunnel.

It was a tremendous project nobly conceived and ably executed, truly an epoch making achievement.

This Company naturally takes pride in the fact that its Flame Weld Bonds were used in the electrification of the tunnel, thus playing some part in this great forward step in transportation.



Flame Weld Signal Bond Type F-2
This is the type of Signal Bond used in the Cascade Tunnel.



Application of Flame Weld Bond
This shows the double application of Flame Weld Bonds used in the Cascade Tunnel.

American Steel & Wire Company

Subsidiary of United States Steel Corporation

Offices in—Boston, Chicago, Cincinnati, Cleveland, Philadelphia, Pittsburgh, Buffalo, Detroit, Oklahoma City, Birmingham, Atlanta, Memphis, Dallas, Denver, Salt Lake City, Minneapolis-St. Paul, Worcester, Wilkes-Barre, St. Louis, Kansas City, Los Angeles, Portland, Seattle.

208 So. LaSalle St., Chicago 30 Church St., New York

U. S. Steel Products Co.: San Francisco, Los Angeles, Portland, Seattle.

Export Representative: 30 Church St., New York City



Euclid Avenue, Cleveland, showing Union Metal Heavy Duty Poles supporting the lighting units, the trolley span wires, and the trolley feeder lines.

"Selling Better Transportation Better"

"PERHAPS the most important step in 'selling better transportation better' is the developing and maintaining of a friendly public," says the editor of the Electric Railway Journal in a recent issue.

Many factors enter into the development of friendly public relations, and not the least of these is the problem of poles. In Cleveland, the Cleveland Railway Company is building good will through the installation of attractive Union Metal Fluted Steel Poles as well as by more obvious means. These poles, used jointly by the railway company and the city, have reduced the number of poles along the curb-line and have substituted an ornamental pole for the old ungainly type.

The result here, as everywhere, has been that good will has accrued to the railway company—and to the city itself. Not only the adjoining property owners but also the general public has been pleased. In addition, over a period of years, this investment will more than pay for itself due to the durability and negligible upkeep expense of Union Metal poles.

Union Metal Design No. 4271 with General Electric Form 23-B lantern as used in Cleveland, Ohio. Over-all height, 24 feet.

THE UNION METAL MANUFACTURING CO.
General Offices and Factory, Canton, Ohio
Branches — New York, Chicago, Philadelphia, Cleveland, Pittsburgh, St. Louis, Los Angeles, San Francisco, Jacksonville.

UNION METAL
DISTRIBUTION AND TRANSMISSION POLES

Cincinnati

plus

Versare

equals

MORE THAN



THE consolidation of the Cincinnati Car Company and the Versare Corporation carries with it a vital message to the Transportation Industry. The purpose for the unification of these two leaders serving the transportation field is the bringing together under one management the manufacturing resources, the engineering experience and the products of both companies, that one organization may serve the entire transportation industry.

In the newly formed company will be found experts in all phases of the transportation field, working in harmony towards the common goal of building *complete* transportation systems.

A MERGER

Thus, the new company, manufacturing electric railway cars, electric coaches and gas-electric coaches, has created for itself a place unique in transportation history. The significance of this merger will be apparent to those executives who must build transportation systems out of disassociated units. With us there are no favorites; whether coach or trolley—or electric coach, our only aim is to furnish the vehicles best suited to the creation of sound, paying, modern transportation systems.

On the following pages are illustrated a few of the products of this new company.



Versare Transportation Units have proved their superior features by hundreds of thousands of miles of successful operation. Illustrated is one of twelve coaches recently ordered by the Surface Transportation Corporation of New York.

Cincinnati Cars are built today for tomorrow's need. A reorder was recently placed for cars identical with those we built six years ago! Below is illustrated one of the latest Cincinnati Cars.



IN the transportation system of every locality there is a place where one, or two, or all of our products are needed.

Our executive and engineering staffs are at your disposal. We will welcome the opportunity to survey communities and lay out plans for complete, balanced, revenue paying transportation systems. Recommendations will be based on sound business principles, rather than on one kind of transportation unit as against another.

THE CINCINNATI CAR CORPORATION
General Offices and Factory
Winton Place, Cincinnati, Ohio

BETTER RIMS Make Better Wheels



Features of Goodyear Type "K" Rims win Builders, Fleet Owners, and the Men who run the trucks and buses

BECAUSE of their efficiency, economy and practical features, bus and truck manufacturers are coming more and more to specify GOODYEAR TYPE "K" RIMS as standard equipment.

Fleet owners praise them because they meet with every requirement — light weight yet powerful, easy to install, inexpensive to replace and make changing from solid or cushion tires to pneumatics a simple matter.

Truck and bus operators like Type "K" rims because they make any wheel demountable at the rim *with only half the weight to handle.* Built simply in two sections, one split and one endless, the rim is taken apart as easily as "pushing a button." Reassembling is just as easy.

Write today to Akron, Ohio, or Los Angeles, California, for detailed information. If you are a manufacturer, Goodyear offers you the fullest co-operation of its engineering staff.

GOODYEAR

Copyright 1929, by The Goodyear Tire & Rubber Co., Inc.

Type "K" Truck & Bus Rim Equipment

LORAIN

Girder Rails, Special Trackwork, Switches, Frogs and Crossings in Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail

The Lorain Steel Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

General Offices: Johnstown, Pennsylvania

Sales Offices:

Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh

Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
Export Representatives: United States Steel Products Co., New York

COLUMBIA

Railway and Utility Supplies

Castings—Grey Iron, Brass and Aluminum

Forgings
Special Machinery and Patterns

Machine and Sheet Metal Work

Armature and Field Coils.

The Columbia Machine Works *and M. I. Co.*
265 Chestnut St., corner Atlantic Ave., Brooklyn, New York

Less than a cent a gallon!

FOR less than one cent a gallon you can make up an Oakite solution that will prove the best thing you ever tried for washing the rattan seats, sashes, woodwork, handholds and windows of cars and busses. Oakite cleans speedily and thoroughly, and is *safe* for all car cleaning.

Many traction companies also use Oakite cleaning materials and methods in their maintenance departments. The Oakite Service Man near you can give you complete details—send for him. No obligation.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames St., NEWYORK, N.Y.

OAKITE

TRADE MARK REG. U.S. PAT. OFF.

Industrial Cleaning Materials and Methods

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

POSITIONS WANTED

AUDITOR, at present employed in related industry, desires to return to transportation field. Years of experience in construction, operation and auditing on a large Eastern system. Can furnish best of references. PW-158, Electric Railway Journal, Tenth Ave. at 36th St., New York.

POSITION wanted as master mechanic. The best of references, long experience. PW-157, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, broad experience, clean successful record covering every phase of transportation, seeks connection with future. Best of references. PW-156, Electric Railway Journal, 1600 Arch St., Phila., Pa.

A MARKET FOR YOUR Rotary Converters

"We are interested in purchasing a number of 500 kw., 60 cycle rotary converters, or larger, those with 33,000 volt transformers preferred. Give full name plate data, general condition and prices both with and without transformers in first letter. Will consider 300 kw. machines if no larger are available."

W-155, Electric Railway Journal.
7 So. Dearborn St., Chicago, Ill

TO HELP YOU

LOCATE COMPETENT MEN

"Searchlight" Advertising

Double Truck Snow Plow

Fully Equipped
Priced to Move Quickly
Also Johnson Type D Fare Boxes
Write or Wire

J. W. GERKE
303 Fifth Ave., New York City, N. Y.

A change in an owner's requirements has put

Several Slightly Used
Model 54, 1928

6-cylinder, 28-passenger

White Parlor Car Busses

in our Used Bus Department

Write for full particulars

THE WHITE CO.
2520 S. Wabash Ave., Chicago, Ill.

"Opportunity" Advertising:

Think "*SEARCHLIGHT*" First!

0100

Saving is a good habit, BUT—
Why Save Things You'll Never Use?

WHY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

TODAY you can turn them over at a fair price. Tomorrow they will be—JUNK. Is it not the better part of good horse-sense to dispose of them NOW?

6000 other electric railway men will see your advertisements of used or surplus equipment and materials here—in the Searchlight Section of their business paper.

Some of these men—officials or executives of other lines in other parts of the country and operating under different conditions—can use what you no longer need. For an insignificant investment you can tell these others what you have. And they will buy.

One "Searchlight" advertiser wrote, "We can cheerfully recommend the Searchlight Section as a wonderful medium for reaching buyers of rails and equipment." Another—"The strongest proof that your 'Searchlight' finds its way to many readers is shown by the numerous letters we have received in answer to our recent ad."

Let us tell you the cost of advertising your used or surplus equipment and materials in the Searchlight Section. Just address a list of what you have to dispose of to the

Searchlight Department

ELECTRIC RAILWAY JOURNAL
Tenth Ave. at 36th St., New York, N. Y.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Tr. Br. Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Regulators, Voltage, Current & Synchronizing
American Brown Boveri Electric Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Illinois Steel Co.
Westinghouse E. & M. Co.

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
International Reg. Co., The

Batteries, Dry
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings, Anti-Friction
Timken Roller Bearing Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co., A.

Bearings, Roller
Timken Roller Bearing Co.

Bearings, Thrust
Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Htg. Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Brill Co. The J. G.

Bolts, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Bolts and Nuts, Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.

Brake Adjusters
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe & Found. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.

Brake Testers
National Ry. Appliance Co.

Brakes, Brake Systems and Brake Parts
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon
General Electric Co.
Morganite Brush Co., Inc.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co., Inc.

Brushholders
Columbia Machine Works
General Electric Co.

Buses
Twin Coach Corp.

Buses, Motor
General Electric Co.
General Motors Truck Co.

Bus Lighting
National Ry. Appliance Co.

Bushings, Case Hardened and Manganese
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
General Electric Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Twin Coach Corp.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

Castings, Brass Composition or Copper
Cincinnati Car Co.
Columbia Machine Works

Castings, Gray Iron and Steel
American Brake Shoe & Found. Corp.
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

Castings, Malleable & Brass
American Brake Shoe & Found. Corp.
Bemis Car Truck Co.
Columbia Machine Works
Timken Roller Bearing Co.

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Change Trays
Cincinnati Car Co.

Circuit Breakers
American Brown Boveri Electric Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Cleaners
Oakite Products, Inc.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.

Coil Banding and Winding Machines
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Coils, Coke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Changers
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Reg. Co., The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Works
Consolidated Car Htg. Co.
Elec. Service Supplies Co.

Controllers or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
American Brass Co.
Anaconda Copper Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Brass Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Reg. Co., The
Roebling's Sons Co., John A.

Cord Connectors and Couplers
Elec. Service Supplies Co.

Couplers Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols-Lintern Co.

Cranes, Hoists & Lifts
Electric Service Supplies Co

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Tr. Br. Co.

Dealer's Machinery & Second Hand Equipment
Gerke, G. W.
Illinois Terminal of Spring field
White Co., The

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Works
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.

Doors, Folding Vestibule
National Pneumatic Co.

Doors & Door Fixtures
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.

Drum Truing Lathes
Nat'l Rlwy. Appliance Co.

Dryers, Sand
Electric Service Supplies Co
Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Electric Service Supplies Co
General Electric Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electrical Wires and Cables
American Steel & Wire Co
John A. Roebling's Sons Co

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Beeler, John A.
Bibbins, Roland J.
Buchanan & Layng Corp.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J. G

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Rlwy. Appliance Co.
Perey Mfg. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.

Fences, Woven Wire & Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Floodlights
Electric Service Supplies Co.
General Electric Co.

Forgings
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Furnaces, Electric
American Brown Boveri Electric Co.

Fuses and Fuse Boxes
Columbia Machine Works
Consolidated Car Htg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gas Electric Drive for Buses
General Electric Co.
Nat'l Rlwy. Appliance Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co. The J. G.
Cincinnati Car Co.

Gear Blanks
Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Columbia Machine Works
Electric Service Supplies Co.
Westinghouse E. & M. Co.

(Continued on page 42)



Johnson Electric Fare Boxes



and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 5000 already in use.

Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

B. A. HEGEMAN, Jr. President H. A. HEGEMAN, First Vice-Pres. and Treas.
F. T. SARGENT, Secretary J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co.

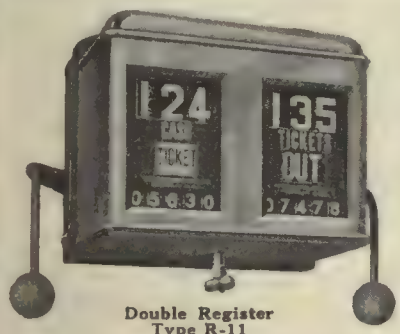
Graybar Building, 420 Lexington Ave., New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Calif.
Lister-Reese Inc., 401 S. Brand Blvd., Glendale, Calif.

RAILWAY SUPPLIES

Houdaille Shock Absorber.
Tool Steel Gears and Pinions
Anglo-American Varnish Co., Varnishes, Enamels, etc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Fighters
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mfg. Co., Springs
Bell Register Fare Boxes
Fraser Gas Electric Drive
Flaxlinum Insulation
Economy Electric Devices Co. Power Saving and Inspection Meters
National Safety Devices Company's Whistle Blowers, Gong Ringers and Brake Hangers
Godward Gas Generators
Cowdrey Automotive Brake Testing Machine
Tru-Drum Lathe



Double Register
Type R-11

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

The International Register Co.

15 South Throop Street, Chicago, Illinois

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.



MARR

An old Turkish custom was to have the guests beat up the bridegroom—*marr* they called it.

Whether it was to acclimate him to married life is not stated.

While we think this formality a little strenuous, still we are firm believers in doing something to register important events in men's minds.

For instance when an operator replaces some misapplied carbon brushes with Morganites, we circle the date on his calendar with red pencil.

This to indicate a red-letter day on which he abolished the petty brush annoyances which *marr* his peace of mind.

Morganite Brush Co., Inc.

Main Office and Factory
3302-3320 Anable Ave., Long Island City, N. Y.

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building.
Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Electrical Engineering Sales Co., 502 Delta Bldg.
San Francisco, Electrical Engineering Sales Co., 222 Underwood Bldg.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 133 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 898 St. Antoine St.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.

Generators
American Brown Boveri Electric Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grinders & Grinding Supplies
Metal & Thermit Corp.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Guard Rail Clamps
Lorain Steel Co.
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Service Supplies Co.

Harps, Trolley
Columbia Machine Works
Elec. Service Supplies Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.

Headlining
Columbia Machine Works

Heaters, Car (Electric)
Consolidated Car Heating Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car Stove
Smith Heater Co., Peter

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Works

Hose, Pneumatic
Westinghouse Tr. Brake Co.

Instruments, Measuring, Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co
General Electric Co.
Westinghouse E. & M. Co.

Jacks (See also Cranes, Hoists and Lifts)
Columbia Machine Works
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Lamp Guards and Fixtures
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Cincinnati Car Co.

Lighting Fixtures, Interior
Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Diesel Electric
American Brown Boveri Electric Co.

Locomotives, Electric
American Brown Boveri Electric Co.
Cincinnati Car Co.
General Electric Co.
Westinghouse E. & M. Co.

Lubricants, Oils and Greases
Universal Lubricating Co.

Lubricating Engineers
Universal Lubricating Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr., & Co.

Manganese Steel Castings
Bemis Car Truck Co.
Lorain Steel Co.

Manganese, Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.

Manganese Steel Switches Frogs and Crossings
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Mirrors, Inside & Outside
Cincinnati Car Co.

Motor Buses, (See Buses)

Motor & Generator Sets
American Brown Boveri Electric Co.

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Motors, Generators and Controls for Electric Buses
General Electric Co.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.

Nuts and Bolts
American Steel Foundries
Bemis Car Truck Co.
Cincinnati Car Co.

Omnibuses (See Buses)

Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Tr. Brake Co.

Paints and Varnishes (Insulating
Elec. Service Supplies Co

Paints & Varnishes, Railway
National Ry. Appliance Co.

Paving Material
American Brake Shoe & Found. Corp.

Pickup, Trolley Wire
Elec. Service Supplies Co.

Pinion Pullers
Elec. Service Supplies Co.

Pinions (See Gears)

Pins, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Pins, Case Hardened, Wood and Iron
American Steel Foundries
Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Works
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Supplies Co.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Union Metal Mfg. Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber & Pole Co.
Intern. Creos. & Const. Co.
Prettyman & Sons, J. F.

Poles and Ties, Treated
Bell Lumber & Pole Co.
Intern. Creos. & Const. Co.

Poles, Trolley
Elec. Service Supplies Co.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Portable Grinders
Railway Trackwork Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Saving Devices
National Ry. Appliance Co.

Pressings, Special Steel
Cincinnati Car Co.

Pressure, Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

Punches, Ticket
International Reg. Co., The

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grirders)

Rail Joints
Illinois Steel Co.
Rail Joint Co.

Rail Joints, Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Corp.
Una Welding & Bonding Co

Rails, Steel
Illinois Steel Co.

Railway Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co
Elec. Service Supplies Co
Hale-Kilburn Co.

Rectifiers Mercury Arc Power
American Brown Boveri Electric Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
International Reg. Co., The

Reinforcement, Concrete
American Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co

Repair Work (See also Coils)
Westinghouse E. & M. Co.

Replacers, Car
American Steel Foundries
Cincinnati Car Co.
Elec. Service Supplies Co.

Resistance
Consolidated Car Htg. Co.
General Electric Co.

Resistance, Wire and Tube
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.

Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.

Sash, Metal Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers Track)

Screw Drivers, Rubber Insulated
Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Second Hand Equipment
Gerke, G. W.
Illinois Terminal of Springfield
White Co., The

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shovels
Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting
Consolidated Car Htg. Co.
Elec. Service Supplies Co
National Pneumatic Co.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Elec. Service Supplies Co.
Nachod and United States Electric Signal Co.

Signal Systems, Highway Crossing
Nachod and United States Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
Cincinnati Car Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Smokestacks, Car
Nichols-Lintern Co.

Snow Plows
National Ry. Appliance Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Works

Snow Sweeper, Rattan
J. G. Brill Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
American Steel & Wire Co.
Illinois Steel Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs
National Ry. Appliance Co.

Springs, Car and Truck
American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co. The J. G.
Cincinnati Car Co.
Standard Steel Works

Sprinklers, Track and Road
Brill Co., The J. G.

Steel, Electric Furnace
American Steel Foundries
Timken Roller Bearing Co.

Steel, Open Hearth
American Steel Foundries
Timken Roller Bearing Co.

Steel and Steel Products
American Steel Foundries
American Steel & Wire Co.
Illinois Steel Co.

Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express)

Structural Steel
American Brown Boveri Electric Corp.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches
American Brown Boveri Electric Corp.
General Electric Co.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo-Ajax Corp.

Switches, Track (See Track Special Work

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Lorain Steel Co.
Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

(Continued on page 44)



Boyerized Parts:

Brake Pins
Brake Hangers
Brake Levers
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ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

— A —

	Page
American Brake Shoe & Foundry Co.	27
American Brass Co., The	44
American Brown Boveri Electric Corp.	17
American Car Co.	Third Cover
American Steel & Wire Co.	29
American Steel Foundries	9
Anaconda Copper Mining Co.	44

— B —

Beeler Organization	26
Bell Lumber & Pole Co.	27
Bemis Car Truck Co.	43
Bethlehem Steel Co.	43
Bibbins, J. Rowland	26
Brill Co., The J. G.	Third Cover
Buchanan & Layng Corp.	26

— C —

Cincinnati Car Corp.	Insert 31-36
Cleveland Fare Box Co.	43
Collier, Inc., Barron G.	24
Columbia Machine Works	38
Consolidated Car Heating Co.	43

— D —

Differential Steel Car Co., The	43

— E —

Electric Ry. Equipment Co.	27
Electric Service Supplies Co.	7
Electric Storage Battery Co.	19

— F —

Faile & Co., E. H.	26
Fisk Tire Co.	25
Ford, Bacon & Davis	26
"For Sale" Ads	39

— G —

General Electric Co.	Back Cover & 22
General Motors Truck Co.	20, 21
Globe Ticket Co.	5
Goodyear Tire & Rubber Co.	37

— H —

Hale-Kilburn Co.	27
"Help Wanted" Ads	39
Hemphill & Wells	26
Holst, Englehardt W.	26

— I —

Illinois Steel Tie Co.	16
International Creosoting & Construction Co.	18
International Register Co., The	41

— J —

Jackson, Walter	26
Johnson Fare Box Co.	41

— K —

Kelker, DeLeuw & Co.	26
Kuhlman Car Co.	Third Cover

— L —

Lorain Steel Co.	38

— M —

Master Plier Corp.	27
McClellan & Junkersfeld	26
Metal & Thermit Corp.	8
Morganite Brush Co.	41

— N —

Nachod and U. S. Signal Co.	27
National Brake Co., Inc.	23
National Pneumatic Co.	15
National Ry. Appliance Co.	41
Nichols Lintern Co.	27

— O —

Oakite Products, Inc.	38
Okonite-Callender Cable Company, Inc., The	43
Okonite Co., The	43

— P —

Perey Mfg. Co., Inc.	27
Positions Wanted and Vacant	39
Prettyman & Sons, J. F.	10

— R —

Rail Joint Co.	27
Railway Track-work Co.	44
Railway Utility Co.	27
Ramapo Ajax Corp.	27
Richey, Albert	26
Roebling's Sons Co., John A.	27

— S —

Sanderson & Porter	26
Searchlight Section	39
Smith Heater Co., Peter	27
Standard Steel Works Co.	6
Star Brass Works	41
Stevens & Wood, Inc.	26
Stone & Webster	26
Stucki Co.	27

— T —

Timken Roller Bearing Co.	Front Cover
Twin Coach Corp.	Insert 11 to 14

— U —

Una Welding & Bonding Co.	27
Union Metal Mfg. Co.	30
Universal Lubricating Co.	43

— W —

"Want" Ads	39
Wason Mfg. Corp.	Third Cover
Westinghouse Elec. & Mfg. Co.	Second Cover
Westinghouse Traction Brake Co.	4
Wharton, Jr. & Co., Inc., Wm.	43
"What and Where to Buy."	40, 42, 44
White Eng. Corp., The J. G.	26
Wish Service, The P. Edw.	26

SEARCHLIGHT SECTION

Classified Advertising

Classification	Page
BUSINESS OPP.	39
EMPLOYMENT	39
USED AND SURPLUS EQUIPMENT	39
Gearke, G. W.	39
Illinois Terminal of Springfield	39
White Co., The	39

WHAT AND WHERE TO BUY—Continued from page 42

Telephone & Telegraph Wire
American Steel & Wire Co.
John A. Roeblings Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.)

Thermostats
Consolidated Car Htg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Tickets & Transfers
Globe Ticket Co.

Tie Plates
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Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
Fisk Tire Co., The
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Tokens
Johnson Fare Box Co.

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Tools, Track, Line & Miscellaneous
American Steel & Wire Co.
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Towers and Transmission Structure
Westinghouse E. & M. Co.

Track Grinders
Metal & Thermit Corp.
Railway Trackwak Co.
Ramapo-Ajax Corp.

Track, Special Work
Columbia Machine Works
Ramapo-Ajax Corp.

Trackless Trolley Cars
Brill Co., The J. G.

Transformers
American Brown Boveri Electric Corp.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety Stair, Car Step
Cincinnati Car Co.

Tree Wire
Okonite Co.
Okonite-Callender Cable Co.

Trolley Buses
Brill Co., The J. G.
Twin Coach Corp.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

Trolley Wheel Bushings
Star Brass Works

Trolley Wheels (See Wheels Trolley)

Trolley Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Min. Co
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Tubing, Steel
Timken Roller Bearing Co.

Turbines, Steam
American Brown Boveri Electric Corp.
General Electric Co.
Westinghouse E. & M. Co.

Turntables
Elec. Service Supplies Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Valves
Westinghouse Tr. Br. Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Htg. Co.
Nichols-Lintern Co.
Nat'l Ry. Appliance Co.
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Welded Rail Joints
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
General Electric Co.
Railway Trackwork Co.
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Welders, Rail Joint
General Electric Co.
Railway Trackwork Co.

Welding Processes and Apparatus
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.
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Welding, Steel
Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire
American Steel & Wire Co.
Railway Trackwork Co.
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Welding Wire and Rods
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Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tire
American Steel Foundries
Bemis Car Truck Co.
Illinois Steel Co.
Standard Steel Works

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
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Wheels, Wrought Steel
Illinois Steel Co.

Whistles, Air
Westinghouse E. & M. Co.
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Cincinnati Car Co.

Wire Rope
American Steel & Wire Co.
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Wires and Cables
American Brass Co.
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ANACONDA TROLLEY WIRE

RAIL GRINDERS AND WELDERS

Railway Track-work Co., Philadelphia

682



A Plan That Makes Money

It is a well known fact that simplified manufacturing methods, applied on a mass production basis, result in lower production costs with a consequent reduction in selling price. General uniformity of design in sectional and end construction under the Brill "MASTER UNIT" plan means economic advantages for operating companies. The chief advantage is *lower first cost.*

Brill MASTER UNIT Cars include eight types to meet the various needs of electric railway transportation. The illustration shows the double-end, eight-wheel car for city service.

THE J. G. BRILL COMPANY
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On the Boston, Revere Beach and Lynn R.R.

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General Electric is prepared to supply line material and apparatus for any electrification, regardless of its nature.

You will find this monogram on line material all over the world. Let G-E line-material experts help you solve your distribution problems.

370-17

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ELECTRIC RAILWAY JOURNAL

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—"Passenger Appeal"



The W-N DRIVE
in Step with the Times

EQUIPMENT, individuals, companies, all must keep in step with the trend of the times or make way for those that do.

Consider, for instance, the electric street car drive. Its first form was the spur gear and pinion. Then came the helical gear, affording a more desirable drive because of its inherent features of noise reduction and longer life.

For the cars of tomorrow that are being specified and built today, there is the W-N Drive, embodying the experience of the past, the requirements of the present, and designed to fulfill the demands of many years to come. The W-N Drive is the most advanced form of street car drive available to the railway industry today.

Having a self-contained double-reduction unit of helical gears revolving on Timken roller bearings in a continuous bath of oil, it provides higher ratios of speed reduction than any previous drive. This, in turn, permits the use of light-weight, high-speed, low-voltage motors with rapid acceleration, greater flexibility, and efficiency. With the W-N Drive, the motor is entirely spring-borne, which means longer motor life.

These important advantages, with many others, make the W-N Drive the logical equipment to put new cars in step with modern trends.

Have you a copy of DMF 5126, describing this drive?

Westinghouse Electric & Manufacturing Company
Nuttall Works Pittsburgh, Pa.
Sales Offices in all the Principal Cities of the United States and Foreign Countries

1929

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Westinghouse

Electric Railway Journal

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1929

Advertising Index—Alphabetical, 10. Classified, 36, 38, 40; Searchlight, 35.

Vol. 73, No. 5 *Pages 189-228*

February 2, 1929

In This Issue

Editorials 189

$50,000,000 Co-ordination Plan for Boston—Constructive Ideas Advanced by Business Men—Expenditures on Upward Path—Recording Accomplishments Is Profitable—As the Noise of the Traffic Battle Grows Louder—The New Morality in Business—Safety in Train Operation—at What Price?

Freight Business Offers Possibilities in Central States 192

BY J. W. MCCLOY

By enlarging facilities, speeding up service and pooling interests, as described by the author, the central railways have increased their freight tonnage and at the same time decreased operating expenses.

Regulation Must Be Related to Economic Law 197

BY R. N. VAN DOREN

Several important phases of public regulation are treated in this analysis, including the purposes, responsibility and economic basis of regulation, and the relation of Congress and the commissions.

Concreted Track for New York Subway 203

BY ROBERT H. JACOBS

The numerous advantages of the type of track construction adopted on the new City subway, using wooden blocks set in concrete for the rail support except under special work, are outlined in this article.

Power Supervising Grows with Chicago Rapid Transit 207

The number of power sources and feeder sections increased to such an extent that it was necessary, for economic reasons and for maintaining good service, to install a central system of power supervision.

Denver Survey Shows Street Car Economical User of Space 196

Traffic Distribution Shown in Clever Advertisement 201

El Paso Reduces Accidents 201

Assets of Employees' Loan Association in Milwaukee Increase 202

Law to Regulate Spray Painting Proposed 206

Turkeys and Hams Awarded Again in Jacksonville 206

C.E.R.A. Sees More Prosperous Times Ahead 209

American Executive Committee Meets in Indianapolis 211

Seventh Coffin Award Contest Announced 212

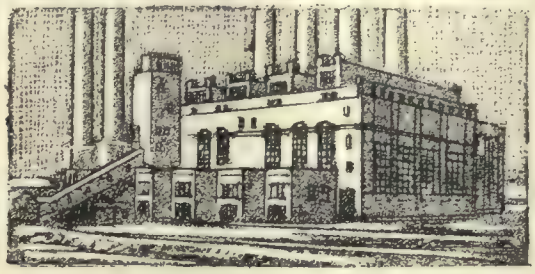
Maintenance Helps That Have Proved Valuable 213

News of the Industry 215

$50,000,000 Program Suggested at Boston—New York Transit Policy Produces Congestion—$7,500,000 Transportation Improvement Program for New Jersey—Big Business a Builder—Seattle Borrows to Meet Its Municipal Railway Obligations



AT DETROIT EDISON



99.92% PERFECT••

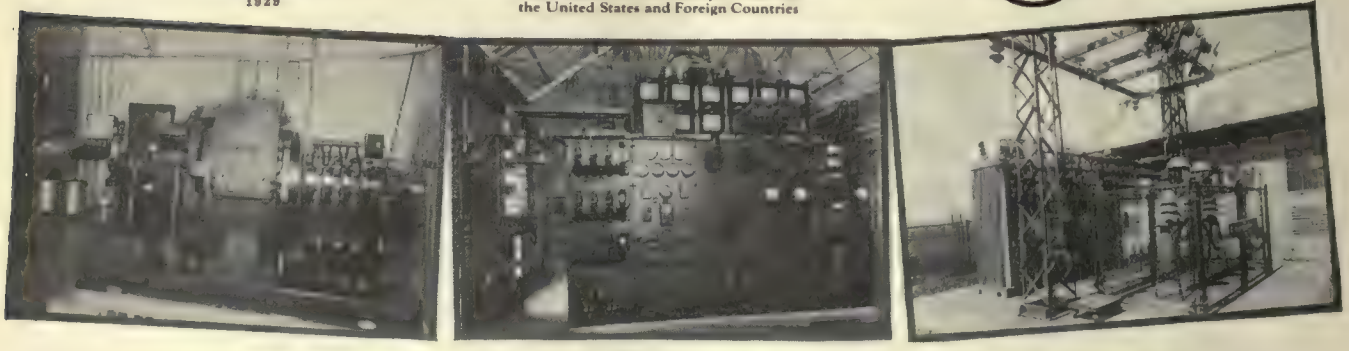
THE Detroit Edison Company, in 1924, placed in operation seven 1000-kw., 60-cycle, Westinghouse automatic synchronous converter substations to supply 600-volt d-c. power to the Port Huron Division of the Detroit United Railways.

Under a systematic schedule of inspection and routine maintenance each substation has maintained its original high efficiency.

A summary of operation for the first six months of 1928 shows that of a total of 13,699 machine operations there were only 0.803 failures of equipment for every 1000 operations --or--99.92 percent perfect performance.

MEMBER AERA 1929

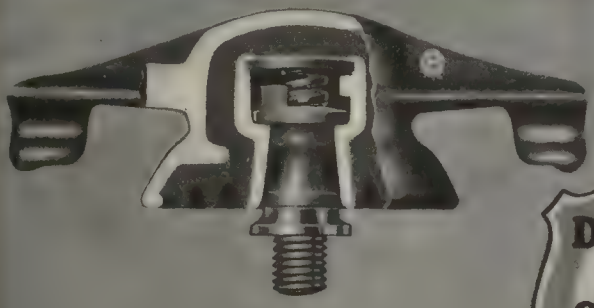
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Westinghouse

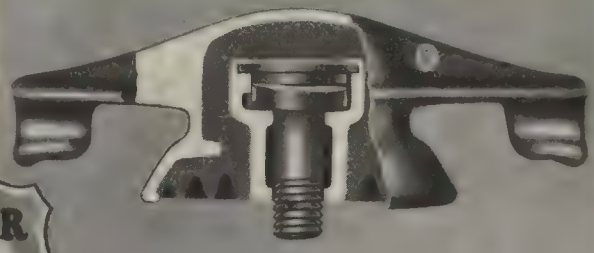
T 30128

Why Do Over 450 Properties Use These Improved O-B Hangers?



The Spring Lock Hanger

DOLLAR AND SENSE INVESTMENTS



The Lock Hanger

WHEN nearly half of the overhead superintendents in the electric railway industry standardize on a product, there is a definite reason. And, since the only reason for standardization is greater serviceability and economy, it follows that the *improved* O-B Hangers *must* have those characteristics which make them serve better and cost less.

The O-B Spring-Lock Hanger—a 1928 improvement—makes possible a permanent, tight joint between the hanger and the ear, yet permits perfect alignment of the ear with the wire. The spring construction gives the stud a "floating" action, which cushions the shock and hammer blow of the wheel as it passes the ear. Thus, wear on the ear and crystallization of the trolley wire are minimized, and service life greatly lengthened.

The O-B Lock Hanger—a time-tried service improvement of many years standing—also provides a tight joint between hanger and ear. The lock feature eliminates the necessity for "backing off" to obtain proper alignment, and does away with the destructive action that occurs when the ear is loose on the stud—thus adding appreciably to the life of hanger, ear and wire.

Both of these O-B Hangers have proven by their records that they are sound "Dollar and Sense Investments" and deserve the consideration of every progressive overhead superintendent. Full information on pages 7 and 8 of Supplement No. 2 to O-B Catalog No. 20.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1016L

Ohio Brass Co.

NEW YORK CHICAGO PHILADELPHIA PITTSBURGH ATLANTA BOSTON SAN FRANCISCO CLEVELAND LOS ANGELES

PORCELAIN INSULATORS
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BETTER RAIL, BETTER TRANSPORTATION

Greenfield rehabilitation profitable—

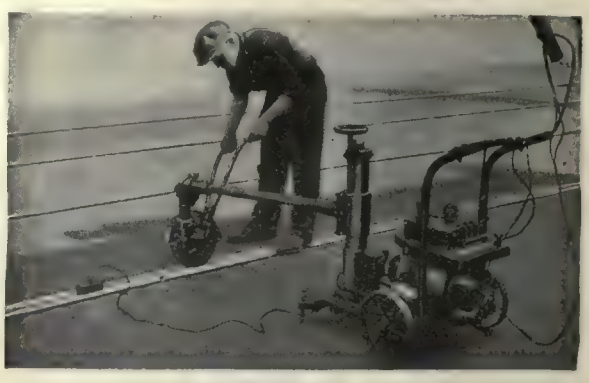
December 20th—Electric Railway Journal commenting on the experience of the Greenfield, Montague Transportation Area:

"*The two towns of Greenfield and Turner's Falls in the township of Montague, paid the receiver of the Connecticut Valley Street Railway $62,000 for 8.7 miles of track with cars and repair facilities.*

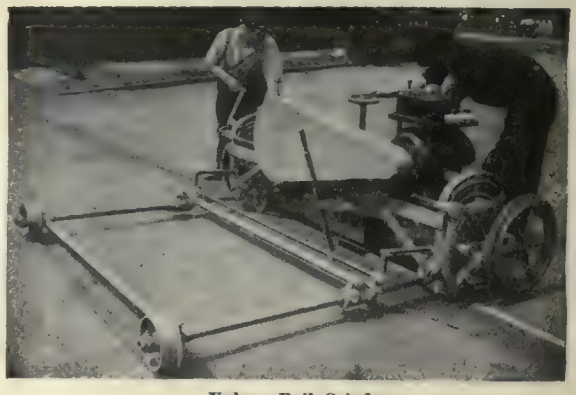
* * * *

The property taken over was not far from the status of junk. Extensive rehabilitation was necessary. . . . ***Hundreds of dished joints were welded and ground smooth.***"

—and the grinding equipment was selected from the group regularly illustrated on this page.



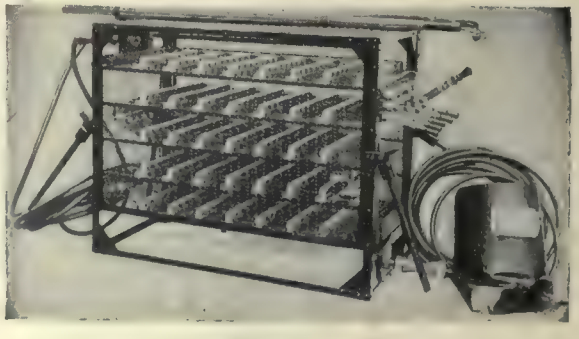
Eureka Radial Rail Grinder



Vulcan Rail Grinder



Electric Rail Grinder



"Ajax" Electric Arc Welder

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

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3178

BETTER RAIL, BETTER TRANSPORTATION

Here's an Unbeatable Combination —*try it out on your cars*

SAMSON SPOT TROLLEY CORD

Samson Spot Cord is strongly recommended as the most durable and most economical trolley cord on the market. It is made of extra quality cotton yarn, is carefully inspected and is guaranteed free from all imperfections of braid or finish. It is waterproofed by a special process which makes it impervious to moisture and prevents shrinking or swelling.

Samson Spot Cord is particularly adapted for use with Keystone Trolley catchers on account of its smoothness of braid and uniformity.

The colored spots identify the genuine.



SEVERAL important improvements mark the new type, Keystone Trolley Catcher: Larger rope capacity, larger reel and increased size of openings to allow free movement of the rope, and a new method of mounting pawls by which quicker action and positive catch is assured.

The pawls made in one piece, are large and heavy, and so arranged that when thrown outward by centrifugal force they slide in position and secure a full flat bearing surface against the stops. This also prevents rebound of the trolley pole, causing releasing of the pawl and thus allowing the trolley pole to fly up again. "Stepping up" of the pole is further prevented due to the fact that the pawls are mounted on a rotatable plate located in the back of the machine, cushioned by a spring, which tends to reduce the shock and further eliminates the possibility of the pawls disengaging. The arrangement of the mechanism also prevents wearing of the ends of the pawls and stops.

It will pay you to get complete details.

AND KEYSTONE TROLLEY CATCHERS



EVERY part of the Keystone Trolley Catcher is made accessible by removing the front nut from the center shaft and provision is made for oiling bearings from the rear.

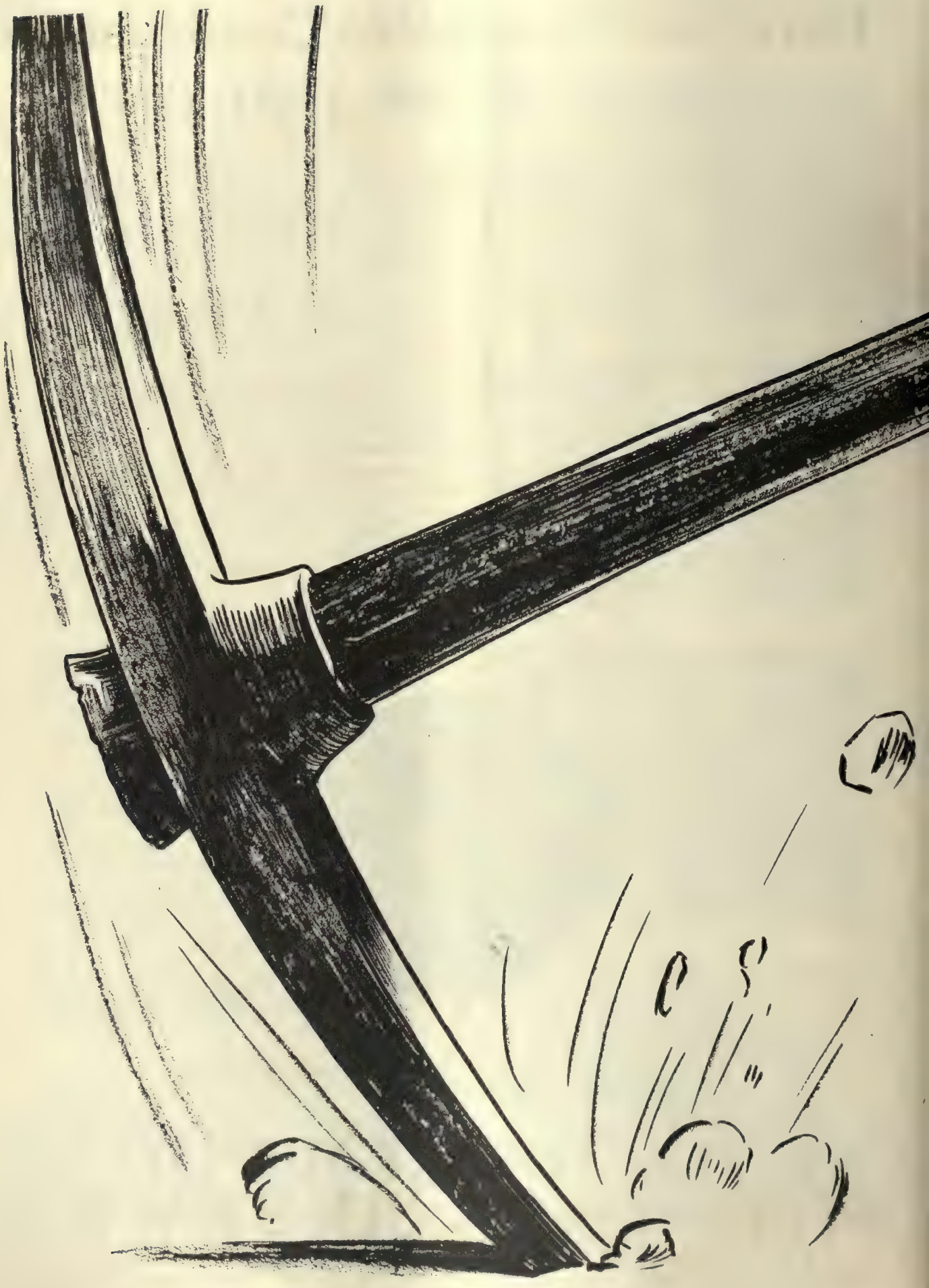
The main spring is provided with a release for one end so that when fully wound it will slip and, therefore, cannot be wound too tightly.

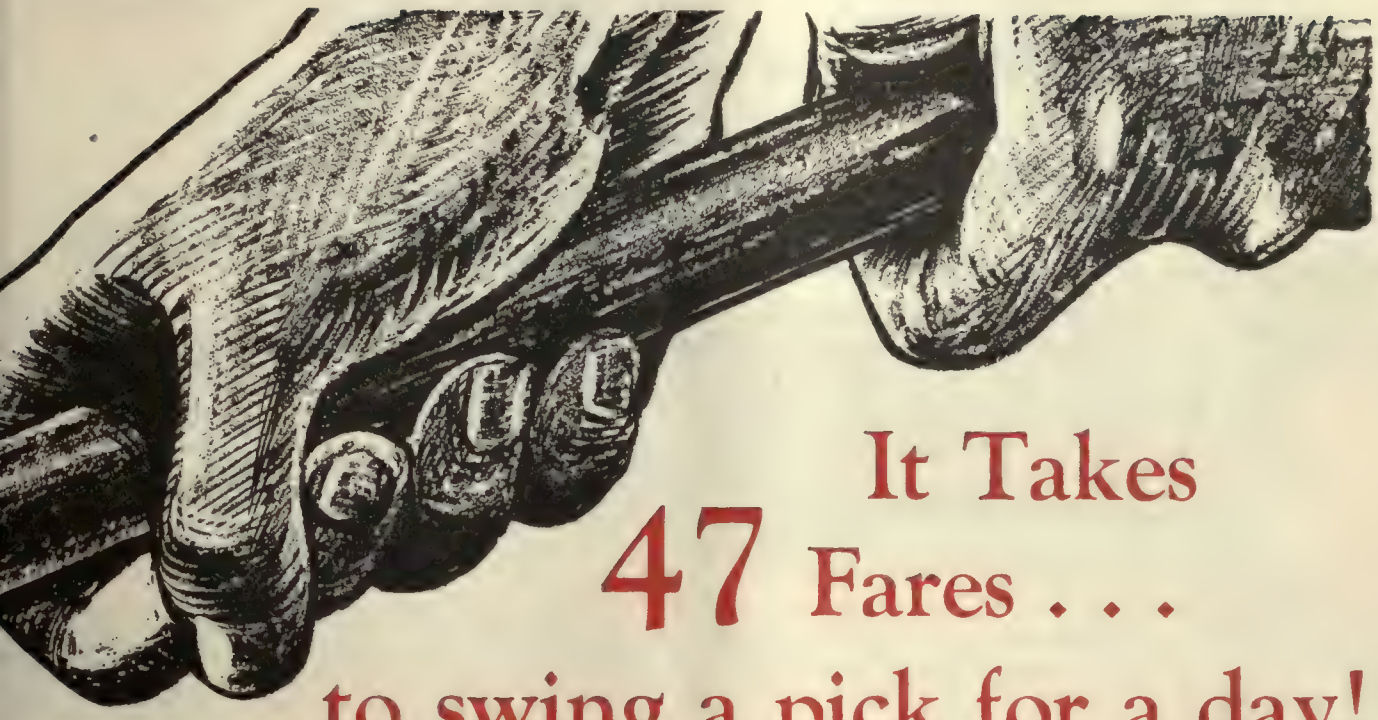
The improved Keystone socket is so arranged that it is impossible to insert the catcher in other than its proper position and in this way, accidental placing of the catcher upside down is prevented.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District Offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL





It Takes 47 Fares . . . to swing a pick for a day!

A "MAN-HOUR" and a pick costs 5.2 average fares. In a nine hour day it takes 47 fares to swing that pick.

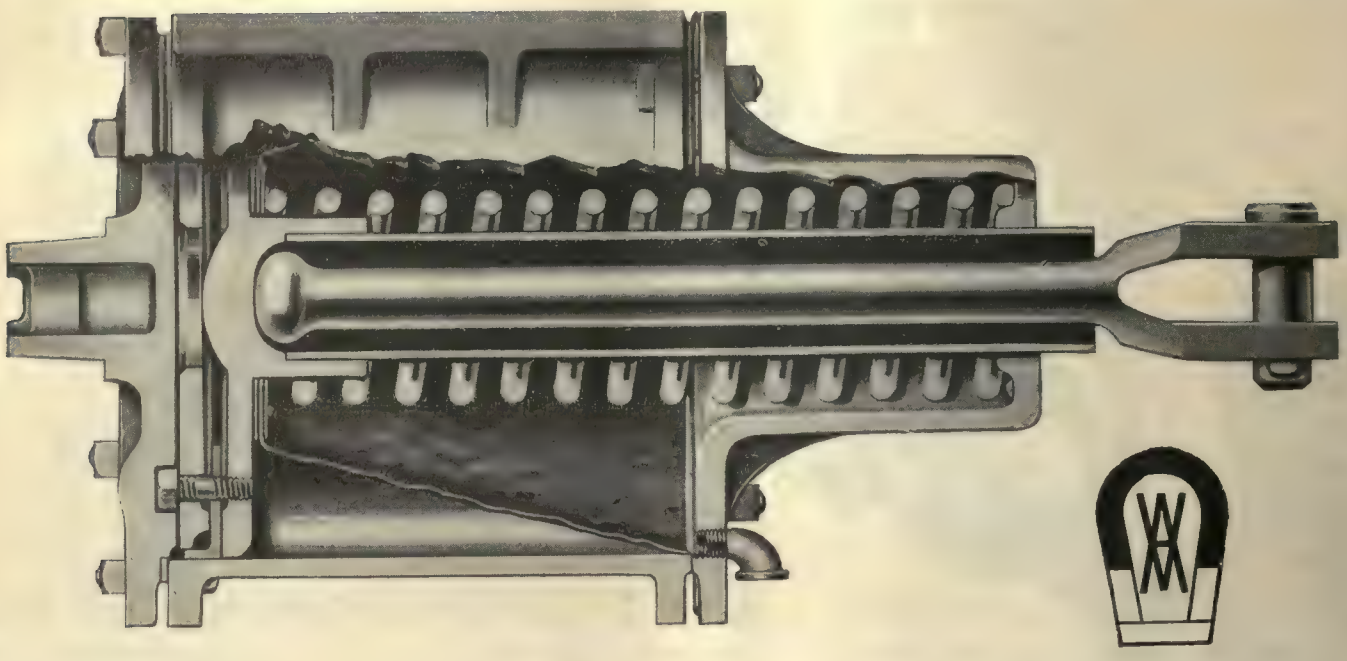
And think of the picks, crow-bars, mauls and other hand-powered tools used on most paved track construction jobs!

Machine methods and Steel Twin Ties when used in paved track construction save many "man-hours" every day—and every time a "man-hour" is saved, the revenue from over five fares is saved. And the work done by machine methods is always better—the tamping more uniform—the ties are assured 100% bearing on base.

The next time you see a gang of laborers picking around a track construction job remember that it takes 470 average fares to pay ten of them for a nine hour day!

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, OHIO

STEEL TWIN TIE TRACK
THE BASE OF MODERNIZATION



Keep your Brake Cylinders CLEAN *with this new Protector*



Use of this protector will lengthen the life of packing cups, reduce leakage, and decrease maintenance costs. It will pay you to specify them for new equipment and also order for cylinders now in service.

An effective means has been devised for preventing dirt and moisture that may sift into the brake cylinder at the non-pressure end from reaching the cylinder walls.

This is a collapsible water proof hood, flanged at one end to form a gasket between the cylinder body and non-pressure head, and held against the piston head by the release spring.

Dirt and moisture are trapped by the hood and discharged through a drain connection at the bottom of the non-pressure head, when the brake is applied.

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, WILMERDING, PA.

2236

WESTINGHOUSE TRACTION BRAKES

Announcing
America's First
Straight Eight Bus - *Built by*
STUDEBAKER



America's First

by

STUDEBAKER

AS indicated by recent American and European shows the trend of modern motor demand is strongly toward the straight eight. Such motors have finer performance, smoother operation and greater stamina.

It was inevitable that the straight eight principle would also be demanded for busses. And to Studebaker foresight and engineering genius goes the distinction of providing the *first* straight eight bus motor. It is as great an improvement over the six as the six was over the four.

Before this new eight was approved by Studebaker engineers, experimental motors were driven a total of three million miles at Studebaker's million dollar proving ground and over cross country routes. The tests covering two years were the most severe ever accorded a bus motor. Now Studebaker's straight eight motor is offered to you as the most perfect power plant modern engineering has yet produced.

Always famous for its power and stamina the Studebaker bus motor now has 115 horsepower and higher efficiency due to its straight eight design. Important features include dual carburetion which in effect gives two carburetors and two manifolds each feeding four cylinders. An automatic choke—motor driven fuel pump—larger generator—heavy fan mounting—weather proof ignition and other improvements.

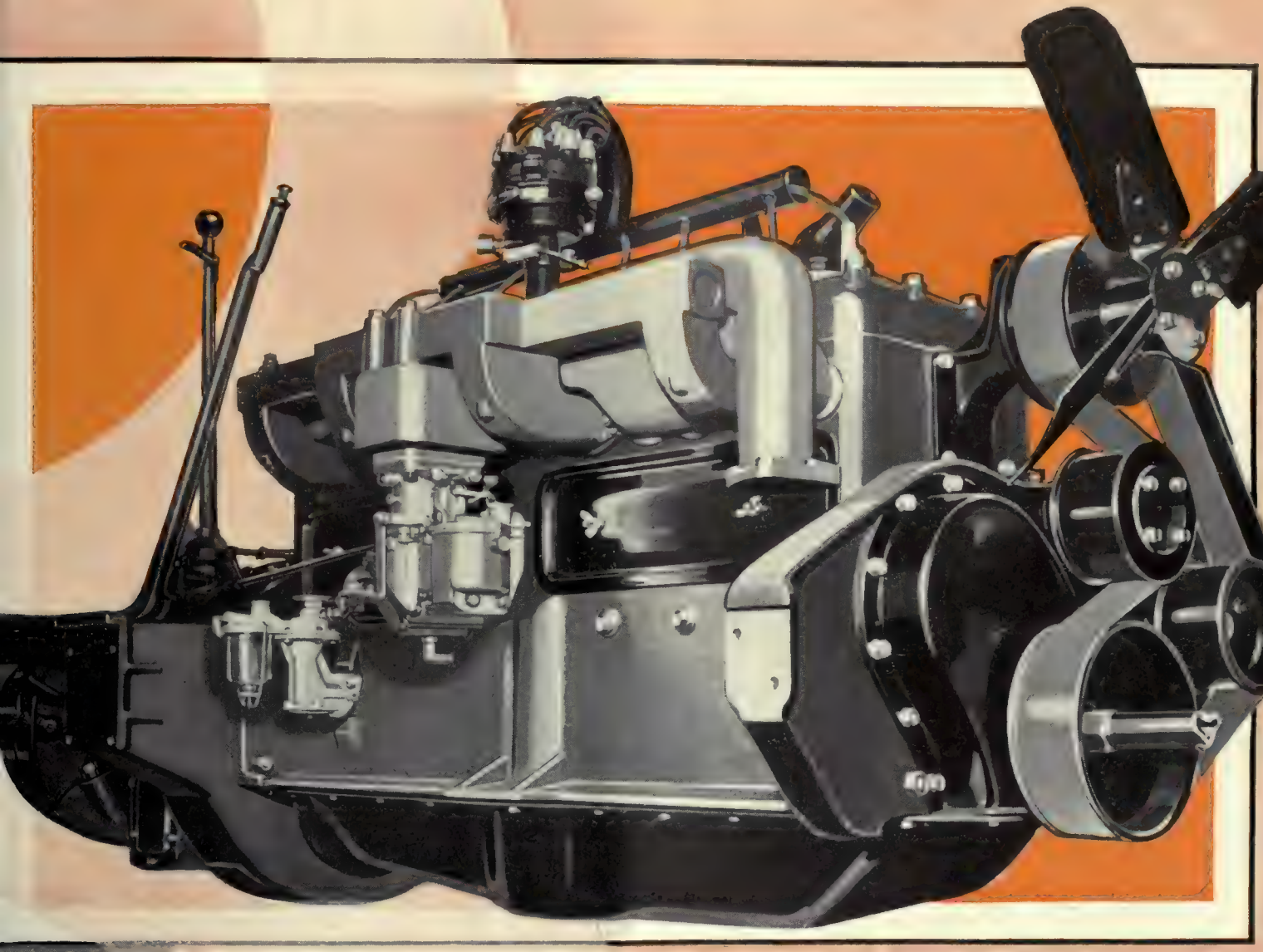
Studebaker eight cylinder busses are offered in chassis of two sizes, 158-inch and 184-inch wheelbases. Because of greater smoothness and therefore greater riding comfort these ultra modern busses build lasting patronage and more profits for the operator.

STUDEBAKER'S 800-acre proving ground where the new straight eight motors were driven 3,000,000 miles in two years of testing. The dependability of this motor has been proved beyond all doubt.



STUDEBAKERS

Straight Eight Bus



115 Horsepower—Eight Cylinders in Line—Dual Carburetion—High Fuel Economy



Studebaker Straight Eight Bus Models and Prices

158-inch Straight Eight Junior Chassis

Chassis only, single or dual rear wheels	$2585

184-inch Straight Eight Special Chassis

Chassis only, single or dual rear wheels	$2985
22-Passenger Seminole Observation Parlor Car	$6595

184-inch Straight Eight Heavy Duty Chassis

Chassis only, single rear wheels	$3385
Chassis only, dual rear wheels	$3485
21-Passenger Street Car Bus	$6095

All prices F. O. B. Factory. Purchase can be arranged on Studebaker's liberal budget payment plan.

THE STUDEBAKER CORPORATION OF AMERICA,
Dept. B South Bend, Ind.

Please send complete information on Studebaker Straight Eight Busses, without obligation.

We have_____busses at present. Check below the Studebaker Bus about which you desire information.

Body Model: Seminole_____ Street Car_____

Name_____

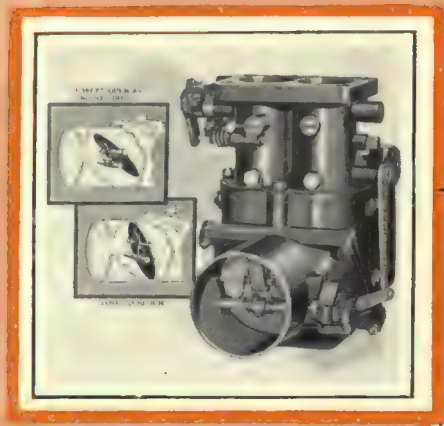
Address_____

City_____ State_____

B-2-29

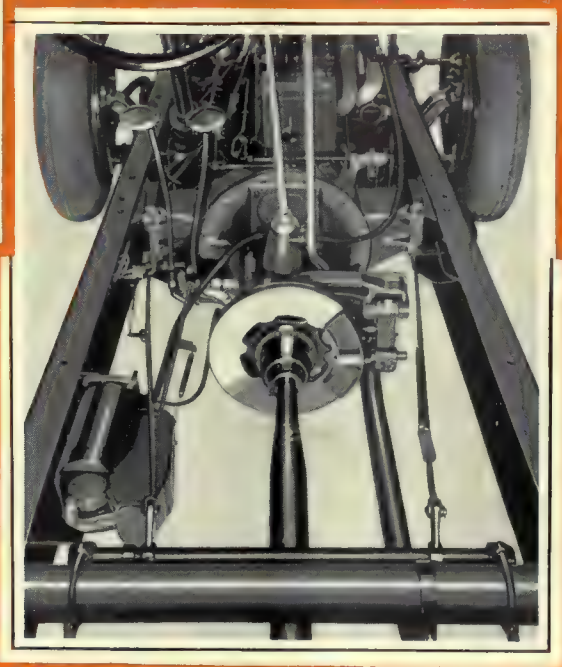
are Profit Makers

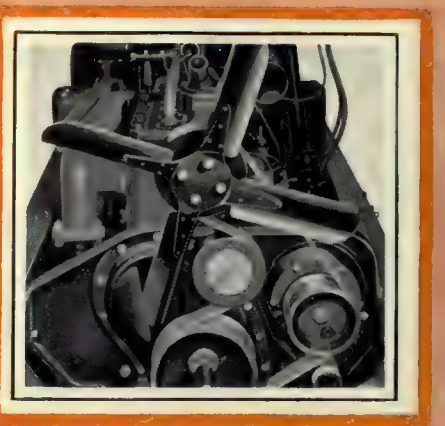
Important Features of
STUDEBAKER'S
New Straight Eight Bus Chassis



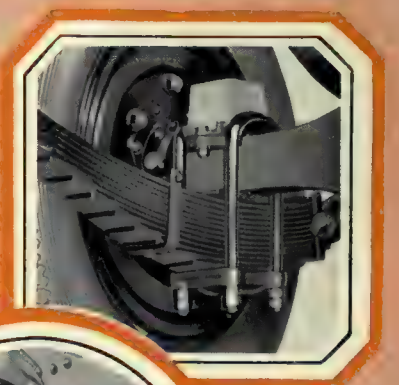
DUAL CARBURETION—Studebaker's new straight eight has a new carburetion system which in effect is two carburetors and two manifolds, each feeding four cylinders. The gas mixture is fed to fully machined combustion chambers through a down draft duplex manifold. An improved type accelerating well and an automatic choke control are important features.

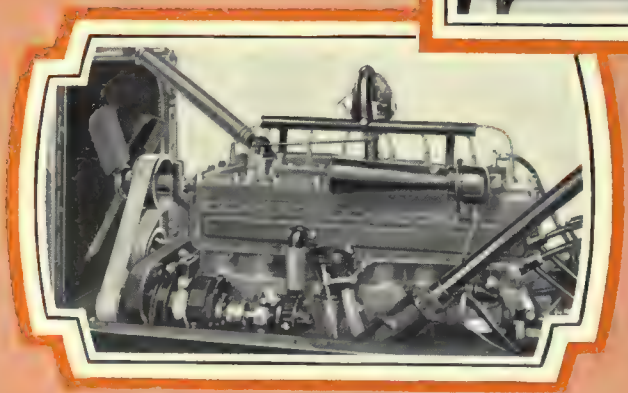
STURDY MOUNTINGS—The rear engine support is a heavy casting so designed as to give great strength to the frame and to permit easier engine removal. Exceptional strength is seen in all units.





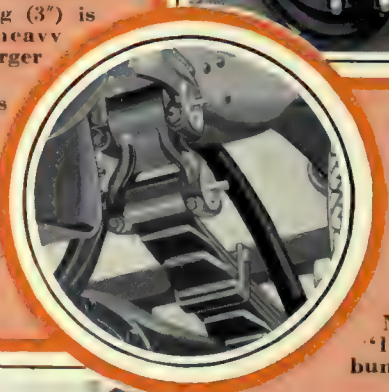
IMPROVED FAN MOUNTING—The 21-inch fan is driven by a 2-inch belt which also drives the accessory shaft carrying the generator and water pump. Note the heavy cast steel front engine support.





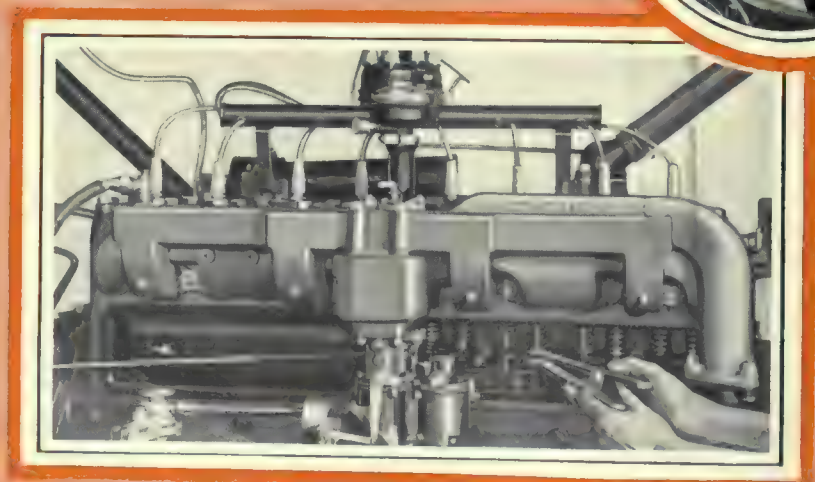
HEAVIER SHACKLES—A wider rear spring (3") is carried in extra heavy shackles with larger spring bolts.

This feature gives greater riding comfort, prevents any tendency to sidesway and insures longer life to body and chassis.



SUPER STRENGTH—Larger U bolts securely fasten the heavy springs to the sturdy rear axle. Note the large "live" rubber bumper block.

LARGER GENERATOR—The over-size generator, water pump and starter are arranged to make servicing easy. Observe the clean cut design and sturdy units. The fan revolves on two ball bearings widely separated to insure perfect balance. The fanbelt "take up" is a part of the U shaped support bracket.



CLEAN CUT DESIGN—This close-up view of the motor shows how clean cut design aids servicing or adjustments.

Note the compactness of the gas feed and carburetion system. From the motor driven fuel pump a short line feeds the acceleration well. The dual carburetor is closely connected to the manifolds, giving positive assurance of complete distribution of gas to every cylinder.

Safety in Tampa



The Tampa Electric Company has received the Brady Award for the best 1927 safety operation of cities in its class.

Safety is of paramount importance in railway operation. And the door that cannot be opened till the car stops moving is an important adjunct to safety.

All Tampa cars are equipped with N.P. operated folding doors and steps, while the latest cars have N.P. Treadles.

TREADLE-IZATION

furthers safety operation

NP

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

DAVIS

"ONE-WEAR"

STEEL WHEELS



AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS


No. 8M5 Special


No. 327-M Special

No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

HEYWOOD-WAKEFIELD COMPANY

Boston, Massachusetts

516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada



Where Safety and Appearance Dominate

IN the heart of a busy city, where safety must be maintained at its maximum, there is nothing so important in the selection of electric line poles as the certainty of their strength and endurance. Another important factor, of course, is their appearance.

Both of these requirements are embodied in the tubular steel pole and reach their maximum effectiveness in "NATIONAL" Poles, because of their great strength and reliability under severe conditions of service and their clean cut, neat appearance which adds to rather than detracts from the built-up surroundings.

Wherever the factors of safety and appearance dominate, it will pay you to specify "NATIONAL" Poles. Made by the largest manufacturer of wrought tubular products in the world, with facilities for meeting a wide range of specifications in pole construction.

Bulletin No. 14—"NATIONAL" Tubular Steel Poles—contains information on manufacture, installation and service conditions, and tables of sizes, weights, lengths, etc. This Bulletin will be sent on request.

NATIONAL

NATIONAL TUBE COMPANY • Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

When Construction Blocks the Road—

Will the Red Lantern be reliable all night long?

THE NEW

EVEREADY PORTABLE FLASHER

THOUSANDS of new roads are being built all over the country. New crossings. New dangers. When autos come thundering out of the darkness—families coming home from town—salesmen driving hard late at night—when they approach your danger sign will there be a warning signal there, regardless of time or weather?

Lives will be saved this year by the new Eveready Portable Flasher. Its penetrating intermittent flashes show the warning red of danger 60 times a minute. The motorist driving home at night with his wife and children sees its gleam of red stabbing through the blackness, and stops. Detours around the danger.

Put an Eveready Portable Flasher on every bad highway corner, dangerous crossing, obstructed street or road, temporary excavation and wherever safety signals are needed. These flashers will take care of themselves for two months without human attention.

Eveready Portable Flashers have absolute, unwavering dependability. They cannot be blown out by the strongest gales. Yet these flashers can be serviced for only $10 a year. They require no daily inspections, and thus eliminate upkeep expense. Buy the new Eveready Portable Flasher from National Carbon Company's distributors.

NATIONAL CARBON COMPANY, INC.
New York, N. Y.

Branches
Atlanta Chicago Kansas City
Long Island City San Francisco

Unit of Union Carbide UCC *and Carbon Corporation*

EVEREADY
TRADE MARK
PORTABLE FLASHER
— dry battery operated





Specifications—Height 16 inches. Diameter of base 7 inches. Weight, including batteries, 16½ pounds. Requires four standard Eveready 6-inch Dry Cells connected in series to deliver 6 volts. Extra 6-volt lamp inside battery housing. Battery compartment constructed of seamless steel attractively finished in red. Top of flasher cadmium plated for weather protection. Heavy fresnel-type red glass lens. Padlock for battery compartment with an extra-long hasp so that the device can be chained. This flasher is of rugged construction throughout and entirely weather-proof.

They took double precautions *when they surfaced this bridge!*



Spy Run Bridge, Fort Wayne, Indiana, doubly protected against traffic impact by Carey Elastite Asphalt Plank and Carey Elastite System of Track Insulation.

WHEN they modernized the Spy Run Bridge, at Fort Wayne, the Indiana Service Corporation did a *thorough* job. First, they safeguarded the structure by applying Carey Elastite Track Insulation. Protection against vibration—a cushion for the rails.

And . . . they floored the bridge with Carey Elastite Asphalt Plank, more than five thousand square feet of it, applied, in two-inch thickness, over a wood decking. A flooring that quiets trusses and struts—a surface that knits and heals under traffic.

Of course, you will want us to tell you more about this unique combination of Carey Elastite Asphalt Plank and Carey Elastite Track Insulation—how their application guarantees a low-maintenance surface that is lastingly smooth. Shall we send you facts and detail drawings?

The Philip Carey Company
Lockland, Cincinnati, Ohio

Carey Elastite
REG. U.S. PAT. OFF.
TRADE MARK REG'D. U.S. PATENT OFFICE

SYSTEM OF
TRACK INSULATION



The Lehigh Valley Transportation Co. uses several types of buses in its fleet, but every one has Goodyear Tires on every wheel

Down in the Lehigh Valley —GOODYEAR BUS TIRES

Down in the Lehigh Valley of Pennsylvania, the twenty buses of the Lehigh Valley Transportation Co. of Allentown have used Goodyears exclusively since May 1, 1925, to the complete satisfaction of the operators.

"They wear well, they ride well, they look well," declares Mr. H. F. Dicke, Vice President. "Goodyears have thoroughly demonstrated their worth to us. That is the reason we use them to the exclusion of all others."

This aggressive bus company carried more than two and a quarter million passengers this year, and their buses have covered some 2,081,980 miles. The remarkable performance of their tires prove that the company's firm faith in Goodyears, with their famous All-Weather Tread and SUPERTWIST casing construction, is indeed well founded.

In every part of the United States, millions ride daily on Goodyear Pneumatic Cord Bus Tires, and daily the number of buses shod with these satisfactory tires is increasing.

For bus operators everywhere, after trials, tests and experience with other kinds, are turning *exclusively* to Goodyears for dependable, consistent, low-cost tire performance.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service

GOODYEAR

Copyright 1929, by The Goodyear Tire & Rubber Co., Inc.

THE GREATEST NAME IN RUBBER





These electric switchers operate beyond the trolley line

Two G-E combination trolley and storage-battery locomotives were recently placed in service by the Chicago, North Shore & Milwaukee Railroad. These locomotives operate with equal ease on electrified lines, on industrial spurs not equipped with overhead, and in buildings where cleanliness and quiet are imperative.

Battery charging from the trolley, as well as the transfer from trolley to battery power, is performed automatically—the engineman need only control the movement of the locomotive.

This monogram on these locomotives is a mark of quality—an emblem denoting economical and reliable operation.

350-58

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
James H. McGraw, *Chairman of the Board*
Malcolm Muir, *President*
H. C. Parmelee, *Editorial Director*

CHARLES GORDON, *Editor*

Louis F. Stoll, *Publishing Director*

Volume 73 New York, Saturday, February 2, 1929 *Number 5*

$50,000,000 Co-ordination Plan for Boston

UNUSUAL interest attaches to the announcement of the ambitious project recommended by the Special Transit Commission for improvements to the Boston Elevated Railway at a cost of about $50,000,000, a sum that does not include additions to rolling stock. While the present Boston Elevated Railway would form the backbone of the system suggested, the matter appears to have been considered on a basis sufficiently broad gaged to provide adequately for the co-ordination of other means of transport, notably the ten lines of railroads extending from Boston in a fan-like formation to practically all sections of the metropolitan area. Some of these lines provide a substantial and satisfactory suburban service to the territories through which they pass, but upon several of them suburban service has been abandoned or curtailed because of the competition with the Elevated, or because of the increase in the use of the automobile.

The new plan contemplates a series of so-called trunk lines extending in all directions from Boston for a distance of about 5 miles, but readily accessible through a series of radiating bus and railway lines with relatively short individual runs. This is the physical side of the proposal. On the financial side the plan intimates a very moderate possible call on taxable funds to pay for the new facilities with tax levies to meet the deficits, a 10-cent fare limit, and an exchange of securities of the Boston Elevated, involving the replacement of preferred stocks by bonds, or a cash alternative, on a basis that would seem at first blush neither oppressive nor over generous. As the Boston News Bureau points out, the main present question would appear to be whether an assumption of a 4 per cent credit basis for the new district's bonds would wholly work out in practice. In its report the commission states that it considers it unwise to use state credit for the benefit of a particular district; consequently, it recommends the creation of a transit district to acquire the properties of the Boston Elevated. It is the bonds of this Transit District that Boston Elevated Railway owners would be entitled to receive in exchange for their present holdings.

This, of course, is not the first time a somewhat similar proposal has been advanced at Boston. In the past there have been periodic but futile attempts to remedy conditions, with political inability hitherto to agree on a policy or details, despite the many successive investigations. Still, as the News Bureau again points out, the previous efforts were not wholly wasted. They supplied bases on which to build and furnished tested items to incorporate into a new scheme.

In the preparation of the present report, the commission has consulted with the Governor of the Commonwealth, the Mayor of Boston, and other public and private parties interested in the Elevated situation in its endeavor to work out a plan fair to the public and thought to be so fair to the stockholders of the elevated that they cannot in reason fail to accept it. Whether or not this may prove to be true it would be foolhardy to attempt to predict. It is not, however, too much to say that, as a whole, there has emerged a thoughtful, well rounded and apparently workmanlike attempt at a general or comprehensive solution, the fate of which hinges on a series of public hearings scheduled to start next week.

Constructive Ideas Advanced by Business Men

JUDGED by the recent report of the traffic and transportation section of the City Club of Los Angeles, the business men of that city are taking a fair-minded and helpful attitude toward their community transportation problem. The subject has been under investigation by a committee of the club during the past year, and a report just made embodies the result of this study. Emphasizing the fact that the public streets are the most valuable land in the central business district, it points out that their use should be developed from the greatest good for the greatest number.

The committee believes that the electric railway must be retained for mass transportation. In the committee's opinion, the bus is not a substitute for the street car but is rather an auxiliary vehicle to be used as a feeder, or to provide additional facilities. Railway service, however, has been handicapped by earnings insufficient to provide adequate and attractive transportation. The public is spending far more for the use of its private automobiles than for the use of public transportation vehicles, thus indicating that there is opportunity for cars and buses to cater to the demand for better transportation by providing improved service. The committee suggests that cars can be speeded up by means of skip stops and the creation of reserved strips in the centers of the streets. Interurban cars should not make local stops. Most important of all, the fare should be made sufficient to encourage improved service. Later it may be desirable to construct a rapid transit system, but the committee is of the opinion that existing facilities should first be co-ordinated and improved to obtain maximum benefit from them.

Several specific recommendations are made to increase the efficiency of the downtown streets. These include an immediate restriction of parking, tending ultimately toward an absolute ban throughout the central business district. Traffic signals should be progressively timed. Street obstructions and pavement openings should be avoided wherever possible. Special privileges should not be allowed where they interfere with public rights.

Not everyone will agree with every feature of the

committee's recommendations. In general, however, these recommendations are well considered and thoroughly practical. The men behind the movement are representative citizens of high standing in the community. Their report indicates careful study of the problem and a fair-minded attitude toward the public transportation agencies. Recommendations emanating from an organization of this kind should meet with widespread approval.

Expenditures on Upward Path

NO ONE can study the budget figures which appeared in the Annual Statistical and Progress Number of this paper without receiving an optimistic impression of the future of the electric railway industry. Expenditures are a true barometer of business conditions for any industry, and it is highly significant that the figures for the past two years and the estimates for 1929 indicate not only a stabilization but a definite upward tendency. The 1927 total of $225,271,000 was almost $8,000,000 lower than the year before. But the 1928 figure showed an increase of almost half a million dollars and the 1929 figure an increase of $4,000,000. Although the increases are not particularly large, they are sufficient to indicate that the low ebb was reached in 1927 and that expenditures will continue to rise, slowly but steadily, in the future.

Analysis of the individual accounts reveals several interesting trends. Expenditures for way and structures charged to capital account reflect the large amount of track activity that has taken place the past few years. The figure for 1927 surpassed all previous figures, but the 1928 total reached a new high mark, exceeding the old by almost $13,000,000. While the companies have been rehabilitating their track, the car account has receded. In fact, the total spent for the cars has decreased steadily from 1925 to and including 1928, dropping from $50,400,000 to $18,900,000. This drop is partly explained by the necessity for rebuilding track before buying new cars.

Of course, much track will be rebuilt after cars have been purchased, but it appears that most operators have been waiting and watching the experimentation in new car design, and meanwhile improving their track. The estimate for new cars for 1929 was placed by the industry at $31,100,000, an increase of 62.5 per cent over the 1928 total. This figure, which is extremely conservative, shows that the managements have postponed the purchase of new cars as long as they possibly can and that they plan now to resume active buying of rolling stock.

Bus manufacturers sold more buses to electric railways during the past year than in any previous year. Following a slight recession in 1927 from the previously high figure for 1926, the total mounted to $19,100,000. That this wave of buying was not temporary is proved by the estimate for 1929 which shows a further increase of $1,200,000.

The decrease between 1926 and 1927, although large, was less than occurred the year before and was a good indication that the bottom had about been reached. It is highly significant that the 1928 total and the estimate for 1929 prove this conclusion to be true. Of course, no startling increases can be expected in the next few years, but it is reasonable to expect a steady climb in expenditures. The process of development within the industry seems to be definitely under way and the budget figures will continue upward.

Recording Accomplishments Is Profitable

FOR the seventh time the invitation has gone to all electric railway executives to enter the contest for the Charles A. Coffin Award. In his letter accompanying the circular of invitation, President Barnes, who also is chairman of the committee on the award, points out that the past year has been one of progress and that there should be many companies which can make just claims for the recognition of the committee.

Nothing could be more stimulating than the presentations which have been made in the last six years by the companies competing. Not only the winning briefs, but practically all that have been submitted, have been replete with statements of accomplishment which not only indicate the excellence of the records made, but also tell the industry as a whole of methods that can be adopted to advantage elsewhere. Were all of the successful plans of building revenue, of improving public relations and of reducing expenses, adopted generally, it is safe to say that the status of community transportation would be elevated greatly.

But it is in the reaction of the company itself in preparing its presentation that the greatest good comes. As Mr. Barnes says, the executives of practically every railway which has sent in a presentation in previous years have testified that its very presentation has tuned up the organization, has given new impetus to the efforts for better performance and has brought facts to the attention of the management which previously had been overlooked. Even the company is lacking in unusual accomplishment, by stopping to take stock, will be spurred on to do better work in the coming year, so that perchance it will be in line to win the prize a year hence. By all means every executive should do his part in furthering his industry's interests and his own as well by entering his company in the contest.

As the Noise of the Traffic Battle Grows Louder

RAYMOND S. TOMPKINS of the United Railways & Electric Company, Baltimore, waxes facetious in the *American Mercury* for February, 1929, in an article headed "Are We Solving the Traffic Problem?" One does not have to read the entire article to get the answer, for the author has reversed the usual process by promptly answering "no" and then proceeding to lay bare the facts on which he bases his conclusion.

It is a stimulating article. It shows the hardihood of the author in digesting facts. It is interesting, for instance, to be reassured that a bibliography of articles on the subject in the technical journals shows more than 2,000 treatises in the past two years, most of them dealing with local troubles in particular cities and offering sure-fire solutions. A stimulating picture is drawn showing the horde of checkers, counter checkers and others following in the wake of the traffic expert whose tomes gather mildew because, at the rate traffic is increasing, most of the reports are worthless six months after publication.

Incidentally he feels that the 167-page report of the committee on street traffic economics of the American Electric Railway Association, should it happen to fall into the hands of a man in the street, would astound him who thinks of the traffic problem in terms of his own daily movement around town and hence believes he could solve it all in fifteen minutes if left alone in a room with

a pad of paper and a pencil. Most likely this report would startle the jay-walker, but the contingency that the report will fall into such hands is remote. The parking controversy he characterizes as one of the most difficult things in the whole traffic tangle. Certainly it is so in Baltimore.

Mr. Tompkins appears to subscribe to the idea of Colonel Sherrill, city manager of Cincinnati, that the proper order of preferences in the streets is first, street cars; second, motor buses; third, taxicabs; and fourth, private motor cars. As a street railway man he cites with apparent elation the suggestion for street car boulevards where cars may zoom along without hindrance while the lucky straphangers thumb their noses at the motorist. He also takes cognizance of the fact that ELECTRIC RAILWAY JOURNAL and *Liberty* fling editorials back and forth at each other. In the author's own words, the noise of the battle grows louder—but it does not settle the traffic problem.

Reverting again to the document of the committee on street traffic economics of the A.E.R.A., Mr. Tompkins quotes from the report to the effect that "the most important purpose to be served by this year's report is to stimulate interest in the lines of investigation suggested, as well as interest in formulating the complete program of approach to this intricate problem." In other words, says the author, having tried to lay the enemy low with one crack and failed, we must now resort to bicycling backward around the ring. To him it looks like a long wait. Discounting the fact that the author of an article intended for use in the *Mercury* could hardly be as prosaic in the arrangement of facts as the traffic expert is in presenting his data and conclusions, it is difficult not to feel at times as does Mr. Tompkins that, compared to the traffic problem, the farm problem is as clear as crystal and the prohibition problem as simple as rolling off a log.

The New Morality in Business

OWEN D. YOUNG has again done big business a real service. As a contribution to a symposium on "What Is Right With the World," he has said some pertinent things about "What Is Right With Business." They needed to be said, and as usual Mr. Young has said them the way they should be said. Business is on a new plane. By and large, it is the plane of the "Golden Rule." There is no lack of good intent. The only trouble in applying the "Golden Rule" is the complexity of the situation. Certainly much of the astuteness and cleverness and sharpness of the old days has disapperared. It is this fact that makes the occasional dereliction of the present day stand out in bold relief. Actions that are just inside the shadow of the law will not do. It is not enough that the act shall be technically within the law. Pusillanimity inflicts its own penalty. It always has. The court of public opinion is more powerful than the verdict of the jury charged with carrying out the letter of the law. From the era of almost unbridled license in railroading and industry with its public-be-damned attitude which arraigned business before the bar of an outraged public opinion and brought in its wake the Interstate Commerce Commission and the Sherman anti-trust law, business has gone a long way.

Business still makes mistakes. It still presents the occasional throwback to the period of the dark ages of trade, but the instances are few and far between. And they are easier to detect because of their contrast with the accepted practices of the day of the new morality. No, business is not perfect. It can never be more nearly perfect than are the individuals of which it is composed. But the individuals that make up business today have a sense of the verities more acutely attuned to their day than did their predecessors. In that transformation the schools of business administration have played no small part. It is so with the engineering schools, from which so many executives of the present day in this industry are recruited. Thus young men coming into business today are being provided with examples from the experience and the mistakes of the past. And they are profiting from these examples. They know that chicanery is not a substitute for knowledge. Big business and big responsibilities need to be welcomed. They are the order of the day. They do not make for wrong. As Mr. Young has said, they tend to make big business right.

Safety in Train Operation—At What Price?

INTERLOCKING of the doors of rapid transit trains with the control of the propulsion motors, which has been used for a number of years on some American systems, continues to grow in popularity. The latest addition to the list is the Long Island Railroad, which, at the request of the New York Transit Commission, has agreed to install such equipment on all of its 970 multiple-unit passenger cars running in New York City. The request of the commission follows observations of the Interborough Rapid Transit Company's subway trains, which have been equipped with a similar device for several years. With the device to be installed on the Long Island cars it will be possible to connect the motors to the power supply only when all the doors are closed and locked. If any door is opened while the train is in motion the power will be disconnected automatically. With this arrangement door accidents should be eliminated.

While the safety of passengers should be enhanced by the new arrangement, it will be necessary to use care to prevent a serious reduction of schedule speed unless the control system is carefully worked out. On the Interborough cars, to eliminate any chance of injury to a passenger who might get his body or his clothing caught in the door while he is entering or leaving, a release was incorporated so that the door would automatically reopen by the exertion of a slight pressure on its edge. As a result it is possible for a few passengers entering or leaving one door to prevent the train from starting. This may be kept up for an indefinite time; in fact, it has been found necessary to employ platform guards to prevent delays at important stations.

In this connection it is interesting to compare American practice with European. On rapid transit trains in those countries it is customary to permit the passengers to open the doors, although ordinarily they are closed by platform or train guards. Despite the apparent opportunities there are comparatively few accidents. The same is true of steam railroad suburban trains in this country. Many of them have open platforms, and even when there are vestibules they frequently are not closed until a trainman walks through the train some time after it leaves the station. On such trains the passengers frequently open the vestibule doors before reaching the stop. Yet there are remarkably few accidents.

A comparison of the accident records of the Long Island before and after the installation of interlocked doors, together with the effect on schedule speed, should throw considerable light on the desirability of this method of control on trains in suburban service.



Electric railways in the Central territory have developed extensive terminals to handle freight business

Freight Business

Offers Possibilities in Central States

Electric railway companies prepare for increasing tonnage. By means of mergers and pooling of interests economies are being effected and more efficient service renderd to shippers

By J. W. McCloy
Assistant Editor *Electric Railway Journal*

COMPRISING nearly 5,000 miles of track, the great network of interconnected interurban railway lines in Ohio, Indiana and the lower Michigan peninsula obtained their main revenue for many years from the passenger business. The older employees of these lines like to tell of the great volume of travel which, beginning on Decoration Day and continuing until Labor Day, used to tax the carrying facilities to the utmost, and could be depended on year after year as a substantial part of the revenue. The advent of the automobile and the coincident construction of hard-surfaced roads put an end to this era. While passenger traffic is still a source of considerable revenue, it has been decreasing for a number of years and new sources of business have had to be developed. The manner in which the situation has been met is an inspiring example of what determination and good honest plugging can accomplish in the face of conditions none too promising.

It has taken more than a strategic location, more than mere physical equipment, more than the natural growth of a great industrial section, to do the job. The stiffest sort of competition has had to be overcome. Intensive solicitation, some very effective advertising, all of the conventional influences have been brought to bear, but in the last analysis it has been a carefully built up policy of service that is bringing results—careful handling and inspection, promptness in notifying consignees of the arrival of shipments, expeditious and fair settlement of

claims, and punctuality in the dispatch and arrival of trains. Interchange tracks, connections with steam line industry tracks, the establishment of freight houses and auxiliary receiving and delivery stations at convenient locations have placed at the service of shippers facilities which insure prompt, reliable, careful and economical handling of merchandise and produce. Fast freight trains, some of them designated by distinctive names, move over the lines on schedules that are adhered to as closely as those governing the movements of passenger cars. Freight houses are kept open 24 hours a day, and shipments are received up to within a few moments of the leaving time of trains.

Where the haul is made over more than one line the general aim is to complete the movement in the original car, thus minimizing the delay and expense of handling. Through cars are being moved without transfer for distances up to 400 miles, often passing over the tracks of five or six separate companies. A feature which is assuming notable proportions is the handling of dispatch freight, small shipments being carried in the baggage compartments of the passenger cars at a charge somewhat higher than that for freight. This has recently been supplemented by the handling of these small shipments on a C.O.D. basis, a nominal charge being made for collection and remittance. This has proved to be a great convenience to merchants and has brought considerable revenue to the roads.

Making an Ally of the Motor Truck

The perplexing problem of store door pick-up and delivery has been solved by arranging for this service with local truckmen in the larger cities and smaller towns. The cost of pick-up and delivery will vary between 5 cents and 15 cents per 100 lb., according to the length of haul. In nearly every instance where it has been tried this supplementary service has resulted in an increase in business and greater satisfaction to the shippers. In some situations it has proved profitable to the railway even where the charge has been absorbed.

Nor does the end of the rail any longer impose a limit on the shipper. Responsible truck lines have been enlisted as auxiliaries, affording an extension of service to points remote from the larger centers and heretofore dependent on the transient carrier. Trucks have also been found useful in concentrating less than carload freight at central points and in transferring merchandise between the freight houses of the various lines.

Convinced as they are that the pre-eminent field of the truck is in urban pick-up and delivery and in the short haul, forward-looking railway executives are endeavoring to bring this idea home to their truck competitors in the hope that they will see the advantage and advisability of turning the long intercity shipments over to the trolley lines rather than attempting to handle them themselves.

Progress Has Been Made in Face of Competition

It is not to be assumed that the electric roads have had an easy task in securing and holding the less than carload business in this highly competitive territory. The motor truck has at all times been an aggressive contender. Rates quoted are often as low as or lower than those of the rail lines, while the ability to render door-to-door service is a distinct advantage and one which is difficult to overcome.



Interconnected lines permit of through-routing between widely separated points in the Central States

More than ever before the farmer is hauling his own stock and produce to market, uncontrolled by any purely economic considerations. Much stock that formerly moved to the Indianapolis abattoirs by interurban is now being conveyed by truck and the farmer, on his return trip, is likely to pick up small shipments for himself and neighbors. This competition, if it can be called competition, will probably become more intense, and is apparently beyond any power or influence to correct. The spread of the chain store movement, which is often followed by the disappearance of the independent dealer, has also worked to the disadvantage of the rails, as the tendency is to effect distribution by contract trucking from centrally located warehouses. The truck is also favored by shippers for the movement of furniture and household goods.

But the fact is widely recognized that the effectiveness of the truck is limited to distances up to 50 miles. Beyond that distance the haul becomes unprofitable, and even more so unless a return load can be assured. Opinion among electric railway men as to whether the motor carrier is losing ground, holding its own or gaining is influenced by local viewpoint with the weight of authority favoring the theory that, as the responsibility among the truckmen grows and realization of this economic limitation is brought home, there will be a tendency to co-operate with the railways in an interchange of freight which should work out to the advantage of both parties as well as the shipper.

Overnight delivery for shippers from Columbus to Indianapolis, Detroit, Fort Wayne and Cleveland; second morning delivery from Columbus to Chicago, Louisville and Terre Haute; third day delivery guaranteed from Indianapolis to points as far east as Warren, Ohio, and as far north as Bay City, Mich.; in short, a recognition of the fact that speed is an all-important element in American business today—this is the factor that is winning the support of shippers and is at the same time putting new life and hope into managers and traffic men of the interurban railway lines in the Central West. The result has been a constantly increasing tonnage until on some of the properties freight revenues constitute more than 50 per cent of the gross.

Among the truckmen themselves the road to success has been by no means an easy one. The business is highly individualized, there is little co-operation or co-ordination, and success is won only at the expense of long hours and arduous labor. In Ohio, the fact that carriers for hire are obliged to secure certificates of convenience and necessity has checked the activities of the fly-by-night element but has, at the same time, strengthened the position of the more responsible operators.

Railway Service Co-ordinated With Steam Roads

Joint through rates have recently been established and through billing is provided for with a number of steam railroads, which serve hundreds of cities and towns in the Central Freight Association territory south of the Ohio River and east of the Mississippi, the exchange being made either at Cincinnati or Louisville. A similar arrangement with the Monon Route permits of an exchange of freight at Indianapolis for Chicago. Points on the Great Lakes are reached during the summer months by a connection with boats operating out of Toledo, Detroit and Cleveland. The establishment of joint rates with the steam road carriers is significant in that it opens the way for still greater co-operation which will open up new markets for both parties to the agreement.

For a number of years all new rolling stock bought for service on the Central Electric lines has been built to certain standards, so as to permit of ready interchange, and many of the older cars have been gradually conformed to this standard. Interchange with steam roads is effected to only a very limited extent, however, due to difference in draw bars, wheel flanges and curve radius. It is true that much steam-road equipment is hauled for short distances, notably between Cincinnati and Mt. Healthy, and even for long distances over open track. The development of an interchangeable drawbar which would pass inspection and meet all physical requirements would greatly extend the possible use of steam railroad equipment, and offers an opportunity which is being given serious consideration.

In spite of the optimism induced by the increasingly favorable freight receipts, there is an undercurrent of uneasiness in certain quarters due to a fear that the limit has been reached in the movement of freight cars over city streets. Already there are objections on this score. Certain municipalities have curbed the practice by legislation; in others it is tolerated but viewed with disfavor. The companies are meeting the situation by voluntarily limiting the length of their trains and restricting the hours of movement. The ultimate solution will probably call either for the construction of belt lines around the cities or the electrification of short sections of existing steam railroad belt lines so as to permit of their use by the trolleys. The Illinois Traction system has resorted to this expedient at Urbana and Champaign, Ill. It is entirely feasible but would probably involve much negotiating and trading with the steam railroads. In the last analysis the economic phase will probably be the determining factor. Mid-Western industry is being so well served by the rails that it would not be likely to approve of any curtailment of their efficiency. If future economic development demands further co-ordination of railroad and interurbans, quite probably ways and means will be found and sufficient pressure brought to bear to bring it about.

With all that has been accomplished in the way of increasing freight tonnage and receipts the Central Electric traffic men realize that there is still much to be done and they are by no means resting on their laurels. Admitting that handling costs are too high, a constant and successful effort is being directed toward economies in this department. A creditable showing is also being made in reducing claims arising from damaged shipments. It is also conceded that the load factor on certain of the load distance scheduled runs is not all that it should be—that more freight could be carried with very little additional expense.

In the field of public relations the freight business has been a powerful factor in influencing public opinion. Business men who would be indifferent to the fate of the trolleys, if passenger traffic alone were at stake, are interested and concerned at the threat of any possible curtailment in freight service, the importance of which

from an economic standpoint is too evident to be ignored. The railway executives have not been slow to grasp the significance of this fact and to turn it to their advantage.

Much of the tonnage now handled consists of merchandise in small shipments. The carload business, except in certain favorable localities, has not assumed large proportions. It is realized that this business is highly profitable and that much of it would be available if suitable facilities for handling could be provided. Unfortunately, the outlay required to secure and handle this business adequately would be considerable, involving the construction of additional team tracks and industrial sidings not only by the originating line but also by the line to whose trackage it was consigned. Additional rolling stock and power would in many cases be required. The possibilities are there, however, and eventually there is no doubt means will be found to take advantage of them.



Samples of shippers' guides distributed by Central Electric Railway properties

Accomplishments of the Illinois Traction System, where the hauling of freight has assumed a position of primary importance, show what can be done. This property has effected traffic agreements with more than 1,600 railroad and boat lines throughout the country. It has established part time off-line agencies in traffic centers as widely separated as New York, Minneapolis, Kansas City and Tulsa. Many of its freight cars are equipped with M.C.B. standard devices for interchange with steam roads, in addition to which they are so designed as to be able to negotiate the company's own short-radius curves. Belt lines have been run around Granite City, Decatur, Edwardsville and Springfield, Ill.

Investigators in the field of freight hauling in the Central territory invariably stress the importance of further consolidations. The advantages are obvious and have been frequently pointed out. For a number of years, following the failure and receivership of some of the larger companies, the tendency was in just the opposite direction and there was a disposition to regard the separate lines, once the part of a unified system, as distinct and individual units. This made for heavier overhead, duplication of effort, delay in the movement of freight and differing policies, a situation from which the industry suffered much. Fortunately, in the handling of freight the community of interest and the necessity of working toward a common end has been sufficient to overcome these unnatural barriers. Now that some of the properties are so obviously making good and have arrived at a point where their balance sheets are again beginning to attract favorable attention the old dreams of consolidation are being revived, and there is a great deal of quiet discussion going on as to ways and means to bring about the realization of this ideal.

Lines in Northern Ohio Point Way to Consolidation

In northern Ohio this dream has recently been realized through the organization of the Electric Railways Freight Company, providing for the joint operation of the freight interests of the following properties:

Pennsylvania-Ohio Power & Light Company, serving the territory in which are located the cities of Sharon and Newcastle, Pa., and Youngstown, Niles, and Warren, Ohio. Northern Ohio Power & Light Company, serving the cities of Bedford, Warren, Ravenna, Kent, Akron, Cleveland, Uhrichsville, Massillon, Canton, Alliance, Barberton, and Wadsworth. Lakeshore Electric Railway, extending from Cleveland to Toledo by way of Lorain, Sandusky, Norwalk and Fremont; Lorain Street Railroad, extending from Lorain to Elyria; Port Clinton division of the Ohio Public Service Company, running from Toledo through Marblehead and Port Clinton to Oak Harbor, on Lake Erie; the Toledo & Indiana Railroad, extending westerly from Toledo through Wauseon to Bryan.

The trackage involved comprises 429 miles of interurban route (513 miles of single track) and 65 miles of city track which will be used for freight purposes. The combined companies own 47 motor cars, 3 locomotives and 131 trail cars of various descriptions. The first four roads named do a distinctly electric railway freight business, utilizing electric railway equipment exclusively, but the bulk of the tonnage over the Port Clinton division and the Toledo & Indiana Railroad will be handled with steam railroad M.C.B. equipment.

It is planned to paint all freight rolling stock a uniform color and subordinate the name of the owning company to that of the Electric Railways Freight Company. A uniform and simplified system of way-billing is to be put into effect. Present plans contemplate neither the purchase of additional rolling stock, the construction of additional warehouse facilities nor the laying of additional track, beyond a possible industrial siding or two, but should business warrant it is believed that the necessary financing could be accomplished by the new company to better advantage than by any of the individual companies. As at present organized the activities of the Electric Railways Freight Company extend no further than the solicitation and handling of freight; actual operation, as heretofore, will be under the jurisdiction of the operating departments of the respective roads.

While it is too early as yet to determine just what the financial results of the pool will be, it is hoped to effect a reduction in expenses by a consolidation of the soliciting and accounting activities, and a more efficient use of the existing rolling stock. More efficient solicitation and the benefits to shippers, due to faster and more dependable service, should result in greater tonnage and increased revenues. This freight merger has been sponsored by some of the most influential and progressive groups in the territory. Its success, which seems assured, will go a long way toward re-establishing the prestige of the trolley lines throughout Ohio and Indiana.

The consolidation of the Cincinnati, Hamilton & Dayton Railway, the Indiana, Columbus & Eastern Traction Company and the Lima & Toledo Railway lines, recently authorized by the Ohio Public Utilities Commission, is another significant move toward the unification of service in this territory. This group of properties, comprising 332 miles of track, brings under one management a direct route extending from the Great Lakes to the Ohio River, and connects the cities of Cincinnati, Dayton, Springfield, Columbus, Lima and Toledo, as well as a number of smaller towns and villages. The route crosses nearly every important east and west steam railway trunk line in the United States.

This consolidation is expected to quicken freight deliveries and make possible the provision of additional freight equipment, the enlargement of existing freight facilities and the construction of additional sidings and extensions. On the operating side substantial economies can be looked for, including the elimination of considerable overhead and much of the duplication in waybilling that was necessary under divided management. Freight schedules can be speeded up and repair work can be concentrated at some central point.

It has been pointed out that the building of but a few miles of line, for instance, from Crawfordsville, Ind., to Danville, Ill., would connect the entire C.E.T.A. system with the trackage of the Illinois Traction System, while the construction of a connecting link between South Bend or Elkhart and Kalamazoo would greatly facilitate the movement of freight by electric traction between Chicago and Detroit.

Freight business is increasing in the Central Electric territory and will continue to do so. The steam railroads, the trucks and the interurbans are all actively competing for this business. Aggressive, forward-looking management and a disposition to meet the requirements of the shippers should enable the electric railways to hold and improve upon the position which they have attained.

Denver Survey Shows Street Car Economical User of Space

COUNTS were made recently in Denver of pedestrians, automobiles and street cars using the downtown streets, for the purpose of determining the best possible location for a belt street to surround the business district. Some interesting data were collected in the survey, relative to the widths of sidewalks required on certain streets and the amount of street space used by automobiles and street cars.

The three principal business streets in the surveyed section of Denver are Fifteenth Street, Sixteenth Street and Seventeenth Street and all have double-track car lines. Like all other downtown streets in Denver they are 80 ft. wide between property lines and have 48-ft roadways and 16-ft sidewalks. One purpose of these studies was to determine whether a reduction of sidewalk width from 16 ft. to 12 ft. and a corresponding increase in width of the street of 8 ft. was desirable.

Sixteenth Street, the main shopping street, was found to have, in 24 hours, between the points counted, 50,000 pedestrians, 14,200 street car passengers in each direction and 12,800 travelers in automobiles in each direction. With this number of pedestrians it was not considered wise to reduce the width of the sidewalk.

Fifteenth Street is primarily a street of grocery stores and contains no department stores, and Seventeenth Street is a bank, railroad office and realty office street, also largely without department stores. Both carry heavy street railway traffic, indicating that such car lines can serve department stores without actually being on the same street.

Some calculations were made in regard to street space used for each type of traffic. In Sixteenth Street the middle 20 ft. of the street devoted to car tracks carried 28,557 passengers, or 1,223 people per foot in width. The automobile lanes on this 48-ft. roadway were found to be uneconomical of street area. They carried 25,412 passengers on 16-ft. widths (from the street width two lanes of parked autos must be substracted), or 1,558 people per foot of street width. These figures must not be confused with maximum capacity figures. The automobile traffic winds in and around street car traffic and takes up part of the street allowed for it.

On the street west of the department store street the proportion is different, 20 ft. of roadway space used by the street cars carrying 42,058 or 2,103 persons per foot of street width. The number of motorists figured on the previous basis is 20,528 on a 16-ft. width, or 1,283 persons per foot of street width.

As a result of the study it was decided to reduce the widths of the sidewalks from 16 ft. to 12 ft. on the outer edges of the downtown district where pedestrian travel is lightest, but not on the main traffic streets.

Regulation Must Be Related to Economic Law

By R. N. Van Doren
Vice-President and General Counsel
Chicago & Northwestern Railway

This analysis, presented before the winter convention of the Central Electric Railway Association in Indianapolis last week, treats of both theoretical and practical considerations involved in the regulation of public and private enterprises

ECONOMIC forces, even in this day of complex industrial development, still operate in all fields where normal and healthy conditions exist. In the rearing of an industrial structure, under the pressure of a rapidly advancing commerce, errors and unfortunate practices enter in and true economics are for the time ignored or defied. This inevitably weakens the structure, and if not discovered and remedied by the industry itself occasions and justifies the intervention of legislative law. As industry advances under the influence of progressive thought, new and improved standards of performance are demanded. If these standards be not accepted and applied, regulation under legislative direction enters the processes of production and enforces compliance therewith. These errors and practices are not the results of economic law, but are defiances thereof. Wise public regulation of industry finds its justification only in the failure of business to conform to proper rules and in seeking to eliminate those conditions inimical to healthy progress.

Justification for Regulation

If all laws dealing with industrial problems had as their aim the restoration of economic freedom there could be no serious objection thereto. But while unhampered economic forces are inexorable, legislative fiat is not so. One law, aimed at a real or imaginary evil, fails of its mission and thereby opens the floodgates of unscientific and uneconomic regulation.

Private industry, as distinguished from public service, has been measurably free from this ultra-regulative process. It has been curbed, it is true, in some of its activities, but only to an extent deemed necessary to prevent a denial of economic justice. There are indications now and then, however, that even private industry is to be subjected to this regulative process. United States Senators are heard in argument in support of the proposal to regulate the prices of commodities, upon the theory that because such commodities are essential to the public weal the industries producing them are impressed with a public purpose. Of course, if this be true there is no basis of distinction between public and private enterprise. We believe it to be both economically and legally unsound. Yet it is perhaps but the natural development of the course of events which has marked the advance of the regulative idea.

It is an increasingly popular habit for our people to assign responsibility for all industrial disorders to the government. This also tends to ease the conscience of those who are defying economic forces. Once an industry is committed to the thought that the government is to blame for its losses, it is the logical thing for it to demand relief from that government. This tendency is being augmented by men in positions of authority who do not, or will not, see the fundamental distinction between regulation of public and private enterprise.

Bituminous Coal Commission

A bill is now pending in Congress by which the private character of the bituminous coal industry is to be legislatively destroyed and that industry is henceforth to be classed with other so-called public service corporations. Without so declaring, the evils of that industry—not its essential qualities—are made the occasion and basis for governmental regulation. A commission to be known as the Bituminous Coal Commission is proposed to be created to regulate that industry; to fix the grades and prices of the products. This, by fiat, places all coal corporations not accepting the act in a class of almost outlawed activity. Primary licenses are to issue to those companies employing union labor, and secondary licenses are provided for open-shop mines with the obvious purpose of forcing all bituminous coal operations into the union fold and placing under a handicap those which choose to maintain the open-shop principle.

Of greater significance and of forboding consequences is the idea which the bill embraces of making that which is in essence a private industry a public service corporation. Evils may exist in the bituminous coal business, but surely there is some way by which such evils may be corrected without revolutionizing the whole concept of American industry. If this step be taken, then there is no limit to which Congress may not go in socializing American industry.

One of the most effective means of preventing an unwise and uneconomic extension of the theory of public regulation to purely private enterprises is to confine the regulation of public service corporations strictly within the limits of its original and fundamental conception. If we permit such regulation to go unbridled and to rove unrestrained, we shall bring discredit to the system and cause it to lose its significant and essential qualities. It is important, it seems to me, that we shall, from time to time, restate the principles of public

regulation, and take stock of our progress to know if we are still within the confines of legitimate and wise political action.

Purposes of Public Regulation

No one who has given serious thought to the subject would now contend for a return to the days of unregulated railroad operation. The conditions which occasioned, and the evils which demanded, the intervention of the public in the operation of the railroads are too well known to admit of a desire for their restoration. Regulation of railroads has come to be acknowledged as a necessary and economic system for the proper and efficient operation of these systems of transportation.

The basic idea of regulation is, of course, that railway transportation shall be furnished to all upon reasonable and non-discriminatory rates; that rebates, concessions and the like shall not be permitted and that the corporate affairs of railroads shall be an open book. At the outset the sole idea was one of restraint. As experience revealed new possibilities of evil the acts of regulation were broadened to include such new problems. Thus the restraints upon the issuance of securities; upon extensions and abandonments; upon interlocking directorates; upon the dealing in commodities transported; and kindred subjects, came to be considered wise and necessary extensions of the laws. Still the predominant idea was one of repression—to curtail those practices which were thought to be inimical to fair and honest operation.

Responsibility of Regulation

The thought that with this repressive regulation there should be some measure of responsibility for the successful operation of the railroads was not entertained prior to the transportation act of 1920. That act contained the significant and important and much misunderstood provisions now embodied in Section 15a of the interstate commerce act. Here was congressional recognition of the fundamental justice of giving some assurance of fair dealing with railroad properties. Of course, it was not a guaranty. But it did most emphatically proclaim a policy which is inherently just and economic. If the transportation act may be permitted to function unhampered by extraneous influences, there is reason to believe that railroad regulation may prove successful both to investors and shippers.

Uneconomic Practices Discouraged

Theoretically, railroad regulation is strictly economic. It aims to prevent those practices which hinder the operation of economic rules. The granting of a rebate or the enforcement of discrimination is uneconomic. Economic law knows no favorites and rigorously enforces its decrees. An unreasonable rate is contrary to economic principles because it retards free movement and reduces carrier revenue. An inadequate rate is not economic, because it fails to provide compensation for valuable service and unduly stimulates the preferred industry. Regulation steps in and fixes the maximum rate, and to the degree to which the determination is wisely reached does regulation recognize economic rule. Since the power to fix minimum rates has been recognized, regulation likewise prevents economic waste by requiring industry to pay for service rendered, and prevents uneconomic carrier competition. It is not in keeping with the economic conservation of industry for unnecessary and duplicated service to be furnished a given community. Regulation asserts that fundamental economics be recognized in railroad extensions and abandonments. Over-capitalization is unwise, and unnecessary security issues are wasteful. Therefore, regulation aims to preserve the economics of finance by supervising such issues.

Transportation—an Element in Production

The point at which railroad regulation breaks down and fails to recognize economic law is in ignoring the essential and integral factor of transportation in production. If the American public can once be brought to a realization of the absolute economic dependence of industry upon transportation, the boasted quality of fair play ought to solve many of our pressing and embarrassing problems.

Industry pays a high scale of wages, because it has come to know that the best service comes from contented and prosperous labor. It wants the best machines, for thereby are ultimate economies effected. It pays current market prices for raw materials and accepts the market as its guide. But while it appreciates the importance of good transportation service it regards the carriers as something apart from the processes of production and pays its charges only because its goods must be moved.

Take agriculture, for example, because it is paramount in the public mind at this time. We erroneously talk about production and transportation as though they were separate and distinct elements in the economics of wealth. When we consider that production is the creation of economic value—the making of wealth available for human wants—we must recognize that production is not complete until the products of the soil are made available for human wants by placing those products where men can utilize them. The price of the farmer's grain is fixed at the central market, and until his grain reaches such market, or is available therefor, it is valueless. Transportation enters into his industrial processes, and does for him what he would otherwise have to do for himself.

When prices of farm produce are high the farmer gives little thought to expense. He expands his operations, buys high-priced land, pays high wages and increases production. When the inevitable recession in prices comes the farmer is naturally discouraged, perhaps resentful, and perforce looks about for means of reducing expenses. More often than not he is encouraged to believe that freight charges are responsible for his misfortunes, or at least that reductions thereof would materially ameliorate his condition. Immediately there appears on the political horizon a host of Moseses who have panaceas for agricultural relief, and chief among them are measures aimed at reduction of transportation charges.

While, of course, freight charges have entered into the sum total of farming expense, they have been proportionately far less than other factors, and constitute an item in the cost of production which justifies itself abundantly. Yet this essential and integral part of production is the one which is made to sustain the chief burden of deflation, notwithstanding the fact that the carriers have also been subjected to many of the same elements of inflation as has the farmer. Complaints of excessive rates are filed and extended hearings are held. Members of Congress are active with bills to force rate reductions, and the whole gamut of uneconomic regulation is run.

I maintain that there is no more economic justification for a compulsory rate reduction in such cases than for a legislative reduction of wages, interest rates or commodity prices. All are essential ingredients of production. Each should respond in due proportion to any program of relief. Especially is this true when the railroads are not allowed, during the period of inflation, to store up excess earnings against the day of diminishing returns. With their rate of return limited, and rarely reached, they are not accorded the benefit of that principle of industry, as well as of frugality, of guarding against the time when deflation reduces traffic and earnings. The theory that railroad rates should be made to fluctuate with the rising and lowering tides of industrial conditions can never be scientifically or economically justified so long as the rate of return be arbitrarily limited. In the larger and more important aspect of the question there can be no sliding scale of rate levels to fit the temporary vicissitudes of commerce. The fact that railroads are public service corporations does not justify an uneconomic treatment of rates. The power to regulate, unlike the power to tax, does not include the power to destroy.

There is no basis for a policy of regulation which uses a public service corporation as an economic gyroscope. Railroads are parts of our economic structure and must be accorded that same measure of economic freedom which other industries enjoy. They should be regulated only to the extent to which they violate or threaten sound business principles, or when they fail to keep pace with modern and approved standards of operation.

Regulation of Motor Vehicles

With this thought in mind, what, then, should be our attitude toward the regulation of motor vehicles using the public highways?

I believe I accurately state the position of the large majority of those concerned in either electric or steam transportation in saying that the railroads have, and claim to have, no vested right in transportation; that whenever a new form of public carriage can transport the inhabitants or products of the nation more expeditiously and more economically than can the railroads the public is entitled to such new form of transportation. In fact, the public has the right to avail itself of such mode of transportation as it chooses, whether or not such mode is faster and cheaper. The only limitation to such right of the public is that vested rights of other carriers—and, some politicians to the contrary notwithstanding, some such rights still exist—shall not be infringed. At the outset of the problem there may have been a thought in some quarters of trying to legislate bus lines out of existence, but it certainly no longer prevails. The enlightened thought of the day, if not one of co-operation, is at least not antagonistic. This position has been most clearly emphasized during the last three years in the hearty co-operation and constructive efforts upon the part of the railroads to work out with the bus interests a satisfactory and workable bill for the regulation of interstate motor bus operations. Starting out with the original Cummins, Parker and Dennison bills, which placed the buses under quite complete control of the Interstate Commerce Commission and afforded real protection to the railroads against this new form of competition, there has evolved the present Parker bill (No. H.R. 15621), which prescribes a minimum regulation of the buses and gives to the railroads but scant consideration. This has been accomplished through compromises upon the part of the railroads in an effort to secure some form of regulation which would to a degree put the carriers more nearly upon a parity of competition. Of course, this object has not been fully accomplished in the proposed bill, nor would it have been the result of the original bills referred to. It should, however, silence the ill-founded charges that the railroads are seeking to kill the bus business by legislation.

The present bill provides that motor bus operators shall obtain certificates of public convenience and necessity from joint boards constituted of representatives of the interested state commissions. Such certificates are transferable, and upon the death of the holder pass directly to his heirs. All motor carriers in *bona fide* operation on Nov. 1, 1928, and continuously down to the date of their application, are entitled to such certificates as a matter of course and without a hearing. Protection to the traveling public is required in the form of bonds approved by the commission. Rates and fares must be published in the form of tariffs, which must be adhered to until changed upon due notice. Operation of the buses is to be made subject to reasonable rules and regulations prescribed by the commission. In substance, these are the provisions of the bill, and surely no one can intelligently claim that they unduly restrict the operation or development of the bus industry. The only provisions of the bill which may be said to give consideration to the interests of the railroads are that in deciding applications for certificates due consideration shall be given, among other pertinent matters, to existing modes of transportation; and that any person, including railroad companies, may acquire certified bus lines without violating the provisions of the anti-trust acts.

Thus is presented a minimum of regulation of motor buses and a mere recognition by Congress of the fact that railroads still exist. Yet this bill is having the earnest support of nearly every railroad in the country.

Let the Fittest Survive

What the future of bus regulation will be no one can foretell. We could not be so vindictive as to wish upon them such a degree of regulation as railroads now enjoy. If, however, the motor bus industry is in harmony with the economic development of the nation and its operators are to be regarded as public service corporations, using the public highways for which they have not paid, and are to continue to compete with other recognized and long-existing forms of common-carrier transportation, they should be required to place such competition upon a basis which will be just and equitable to their competitors. Then let the fittest survive.

It would appear that our friends, the state commissions, do not want the railroads to compete with buses. At the convention of the National Association of Railroad and Utilities Commissioners at New Orleans, on Nov. 16, 1928, a report submitted by Mr. Morgan of Alabama was adopted criticizing the railroads for granting excursion rates in bus competitive territory and calling for an investigation as to the lawfulness thereof.

Fair, or Subsidized Competition?

In the beginnings of railroads, competition with then existing canal routes was effectively prevented by prohibiting railroad rates being less than competing canal rates. Even with this handicap the railroads won out through superiority of service. That law was designed

to preserve investments in canal properties. Now Congress is reversing the current of economic trend by declaring a national policy in favor of inland waterways. By a law enacted at the last session of Congress it is proposed to develop inland waterways at the expense of the government, operate barge lines thereon at the expense of the government until they have proved to be profitable and then to sell them to private interests. In order to assure the success of the barge lines the steam railways are required to establish joint through routes and joint rates with the barge lines and to afford divisions of such rates from the railroad revenue. Because of the inferiority of service on such through routes due to the factor of barge-line carriage such through rate must be lower than the all-rail rate. Clear principles of economic law would require the factor which is responsible for the poorer service to bear the decrease in the rate. But in this case such principles are ignored and the railroads are required to absorb such decrease. Thus has the government again gone into the subsidy business; but for the first time in our history one industry—the government itself—is to be subsidized at the expense of its competitors. This is government ownership with a vengeance.

Commission or Congressional Regulation?

Rate making and other public utility regulative functions are primarily legislative in character. For years this legislative power was exercised by direct action of legislative bodies. The books are full of statutory enactments dealing with almost every feature of railway operation and management. Maximum rates and fares statutes are still in force in many states; even in those states which now have regulatory commissions. There came a time, however, when legislators realized their lack of time and capacity to handle properly such a specialized and complicated problem; consequently the commission form of regulation.

There are doubtless many defects in commission regulation of railroads, and at times we are prone to rail against what at the time appears to be a gross misapprehension of the facts and of the remedy to be applied. But with all its shortcomings it is a decided improvement over the former plan of direct action by Legislatures. It is the best method of public regulation yet devised, but will continue to merit the confidence of the public and of the railroads only so long as it is permitted to carry out the purpose and plan of its original conception, namely, regulation by an impartial specialized body, removed, so far as a governmental department can be removed, from the effects of party or political influence.

Being an arm of the legislative branch of the government there is danger that it will not be permitted to work out its problems in an impartial and scientific way. There is a growing tendency to override acts of commissions by direct legislative acts and to give to the commissions arbitrary directions not founded upon well-considered or economic study.

Instances of such direct action are afforded by the 2-cent passenger fare law of Wisconsin, passed after the creation of the Railroad Commission, and after that commission had conducted an extensive investigation into the matter of such fares, resulting in an order fixing 2½ cents as the basic fare. The passage of the Hoch-Smith resolution was an ill-advised, and I think an unwise, piece of legislation, and marks a tendency which, if extended, will completely undermine the whole structure of commission regulation. That there are indications that it may be extended is evident from the action of the Senate committee on interstate commerce, in reporting for passage the bill to repeal the so-called Pullman surcharge after the Interstate Commerce Commission had, upon full investigation and after extended hearings, found such surcharge to be justified and the amount thereof not unreasonable.

As indicating a more enlightened and statesmanlike attitude on the part of the Senate the recent confirmation of Commissioners Aitchison, Porter and Farrell, without discussion in committee or on the floor, is most encouraging, and, we may hope, marks a renewal of adherence to the principle of disinterested and specialized regulation of public service corporations.

The commission, being an arm of the legislative body, it is of course within the legitimate province of that body to prescribe the jurisdiction and organization of its agent. But having once determined upon the policy of scientific regulation, divorced so far as possible from political interference, Congress should respect that determination and leave the development of the regulative idea to those whom it has designated as best qualified for the task. The railroads have but one recourse against unfavorable determinations of the commission. That same limitation of remedy should apply to shippers and to the public generally. There should never, under any circumstances, be a resort to Congress to undo or overrule a determination once formally made by the commission. What may under extreme circumstances seem to justify a congressional appeal will but afford justification for similar appeals where conditions are not extreme.

Congress will, of course, always retain and doubtless exercise the right to amend or repeal the whole or any part of the law. While we may question the wisdom and challenge the validity of a particular amending or repealing bill, we may not consistently or intelligently doubt the power of Congress so to act. But when the particular bill proposes to overturn a decision once formally made by the commission, or seeks to substitute congressional for commission judgment, we may, and should, vigorously protest and oppose such action.

The whole public, shipper and investor alike, have the right to rely upon the impartial and honest determination of their rights in transportation. They have been repeatedly assured through 40 years of public regulation of the permanency of the commission form of regulation. It will utterly destroy confidence in public regulation if Congress shall, at this late day, retake jurisdiction of this complicated and delicate task.

There are two methods of exerting legislative interference with commission action. One is by direct legislative act; the other is by coercion. It is regarded as unethical for attorneys of record to make public comment of cases pending before courts, but such conduct is at worst but a breach of that respect and deference which should be maintained between bench and bar. There is no element of intimidation or improper influence in it. But when a member of Congress makes a speech upon a matter then pending before the Interstate Commerce Commission, and with reference to which no bill is pending in Congress, it can have but one purpose—the exerting of a coercive influence upon the commission. Unfortunately, this practice is becoming too common and should be condemned by all fair-minded men.

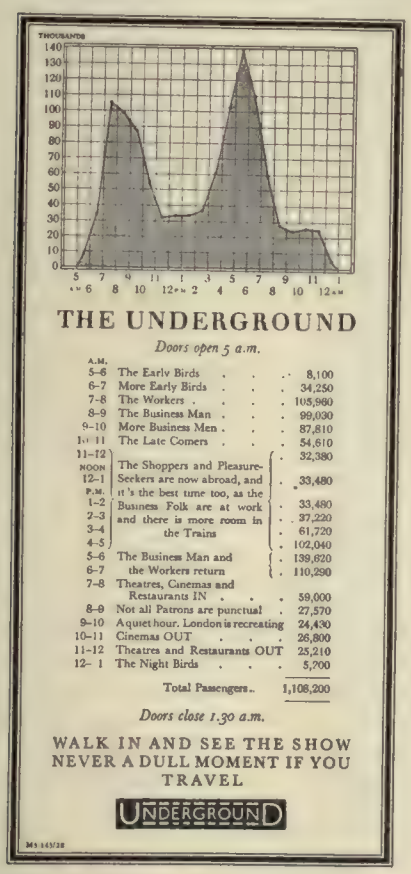
Unless we can preserve that respect and confidence in the commission which is its strength and pride, we can-

not hope for a maintenance of its past record of conscientious and impartial effort. We cannot afford, by carelessness and indifference to these matters, to lend sanction to practices which can but eventually destroy all confidence in commissions.

Twenty-five years ago the railroads were told to get out of politics and to stay out. In return they were given every honorable assurance that their affairs would thereafter be regulated by an impartial governmental body removed from political influence. In 1905 President Roosevelt announced his famous doctrine of a square deal, just prior to the passage of the Hepburn act which was designed to give vitality to the Interstate Commerce Commission. I cannot do better in submitting this subject to you than to quote that virile American statesman, whose pronouncements were usually consonant with safe and sound economic laws. He said:

"It must be understood as a matter of course that if this power is granted it is to be exercised with wisdom and caution and self-restraint. The interstate commerce commissioner or other government official who failed to protect a railroad that was in the right against any clamor, no matter how violent on the part of the public, would be guilty of as gross a wrong as if he corruptly rendered improper service to the railroad at the expense of the public. When I say a square deal I mean a square deal; exactly as much a square deal for the rich man as for the poor man; but no more. Let each stand on his merits, receive what is due him and be judged according to his desserts. To more he is not entitled, and less he shall not have."

Traffic Distribution Shown in Clever Advertisement



How the traffic on the London Underground varies throughout the day is interestingly told in this newspaper advertisement

El Paso Reduces Accidents

For important progress in safe operation made during 1927, company wins honorable mention in Brady contest

SO NOTABLE was the record of the El Paso Electric Company in the prevention of accidents during 1927, that it received the Brady Safety Award, given to companies operating between 1,000,000 and 5,000,000 vehicle-miles during the year. When the time for the 1928 safety contest came around, based on the records during 1927, it was found that the El Paso Company had bettered its remarkable 1926 record. While the committee on awards for the Brady prize decided to give the first prize to another company in the properties operating from 1,000,000 to 5,000,000 vehicle-miles a year, it is not surprising that the El Paso Electric Company should have received honorable mention.

Particulars of many of the safety practices of the company, as followed a year ago, were given on Page 193 of ELECTRIC RAILWAY JOURNAL for Feb. 4, 1928.

SEVEN-YEAR ACCIDENT RECORD, EL PASO ELECTRIC RAILWAY OPERATIONS

Year	Total Accidents	Accidents per 10,000 Car-Mile	Accidents per 100,000 Passengers
1921	1,867	5.83	9.81
1922	1,401	4.34	6.60
1923	1,022	2.94	4.84
1924	611	1.82	3.16
1925	546	1.65	2.85
1926	452	1.42	2.43
1927	445	1.35	2.42

Most of the methods then followed are still employed. In addition, the company has introduced a number of other plans. Following is a summary of those not previously mentioned.

A great deal of attention is given to the protection of school children because of the well-known heedlessness of children of that age. Activities within the schools include the showing of motion picture films on safety subjects. The company makes arrangements to secure these films and furnishes a projector and an operator whenever required. Pamphlets dealing with different phases of safety are distributed in the public schools and are often used as the basis for themes in class work. The company also frequently furnishes students with safety and other data covering its own operations. Safety calendars are provided for all classrooms, and every effort is made to encourage the children to think of safety.

During the year, students in all the high schools in Texas were invited to prepare art posters in a state-wide contest. The art teacher in the El Paso High School, having noted some excellent safety posters on the dash boards of the electric cars in El Paso, suggested to some of the students that they might use the topics of safety for their posters, and a number did so. Later these posters were exhibited in El Paso. Another teacher wrote a text book on safety for schools, and copies of this book were placed with each teacher in the school system as a guide in safety work. These two incidents show the prevalence of the safety influence in El Paso.

The efforts of the company, however, do not end here. In all cases where children are found playing near the car tracks, stealing rides, or in any other way molesting the company's equipment, their names are secured and a letter is sent to the parent. Frequently, personal calls

are made upon parents in reference to such cases. The point is made that the company's interest is to protect the youngsters from possible harm and that they should be warned of the danger of such practices.

The company's line to the high school ends at the top of a rather steep grade. To guard against the possibility of an accident in case of brake failures, and to provide a greater factor of safety in the event that students should tamper with the equipment while the operator is changing ends, all cars on this line have been equipped with wheel blocks of oak. When the car stops at the end of the line the wheel block is immediately put in place. The result is, if any of the boys should board the car and release the air, or if the brakes do not hold, the wheel block will prevent the car from running away.

Other Simple Precautions

The rule governing the operation of cars at street intersections has been found to help reduce accidents. The rule provides that two cars shall never be in the intersection at the same time. The question of right-of-way is not covered by any rule but is left to the judgment of the operators. Another rule to prevent collisions says that cars on the same line shall remain at least a block apart, especially in the down town section or when passing an important junction point. Cars are permitted to approach sidings and curves only at a speed not exceeding 4 m.p.h.

At two places, car lines cross bridges on trestles at points where children are in the habit of congregating. One of these bridges is close to a school. The other is near a point where caddies gather on their trips to and from the golf courses at the El Paso Country Club. It was noticed that the youngsters at play around the trestle would sometimes put their heads through the open spaces between the ties, thus placing themselves in positions of danger. When this practice was discovered the company eliminated this accident hazard by boarding over the open spaces.

Precautions against accident are not confined to the highways but have been extended to the shops. Thus, where belts and gears are used on machines, they have been properly inclosed in wire nettings, wooden cases or other protective equipment. The workmen painting the cars with the spray process use respiratory apparatus for greater safety. Outside construction is done as much as possible at night, and all tools and material required are kept at one side of the street so that the other side may remain open. On a double track line, when one side of the street is finished, the materials and tools are moved to the other side of the street.

A great deal of interest is given to safety contests and no-accident periods. All street cars and buses were operated for six consecutive days without accidents of any kind in February, 1927, and again in March, 1927. The previous best record was five consecutive days. The company had a total of sixteen no-accident days in 1926 and 127 no-accident days in 1927.

Various Contests Are Staged

During the year, various contests are staged, lasting for one week or three months at the most. To a large extent these were the outcome of wagers between the various inspectors and operators who became "pepped up" over results already accomplished. An accident bogey of 450 was set with a total of 125 no-accident days for the year 1927. A chart, prominently displayed, showed the accidents as they occurred, indicating at a glance the status of the accident situation and its relation to the bogey at all times. This kept interest in the contest at a high pitch. The results were very close in October with everyone working to beat the bogey. At this time the manager promised all inspectors a dinner if they made 20 additional no-accident days between that time and the end of the year, which would put them well over the bogey. Everything went well until Dec. 23, when they had made 19 of the no accident days, but during the holiday rush the men failed in their attempt to make another no-accident day during the year. However, they had the dinner, partly because of their untiring efforts to win it, but more because they had accomplished the original objective by completing the year with 127 no-accident days and a total of only 425 accidents.

The bogey contest proved to be one of the most effective plans employed in the accident reduction campaign and was adopted as a regular feature of the company's safety program.

In addition, the company has an honor roll and safety star merit system, both of which have proved very successful in reducing accidents. The honor roll is compiled every month and contains the names of all operators who have worked during the previous month without having an accident. A trainman who has been on the honor roll for two consecutive months has a day off with full pay. For each consecutive month thereafter that he is on the honor roll he has an additional day off with pay. If he has an accident he has to start over again.

In addition, a trainman on completing twelve consecutive months operation without an accident receives a gold star. Individual stars are given for each year up to and including four years. When a trainman completes four years operation without an accident, he receives a large gold star with a numeral worked in the center, indicating the length of time he has operated without an accident. The system is known to the patrons of the road and the possession of these stars is a source of pride to trainmen.

The honor roll system has been in effect for eight years, and at present 70 per cent of all trainmen are gold star operators.

In addition, the company has division contests, with small horses on a miniature race track to stimulate interest in the records of the divisions. Every day that a division has no accidents, its horse is moved forward 5 notches on the track. In the case of one accident he is moved up four notches, two accidents, three notches, and so on. The horses bear the name of inspectors on the different divisions to make the contest more personal. The winning division receives a banner and the operators and inspectors are entertained at a banquet.

Assets of Employees' Loan Association in Milwaukee Increase

ASSETS of $10,323,129 are shown in the annual report of the Employees' Mutual Saving, Building and Loan Association, comprised of employees of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. This represents an increase of 12.8 per cent for the year. Mortgage loans amounting to $2,266,922 were made during 1928, and $1,229,413 in mortgage loans were retired. At the close of the year the association had outstanding 3,359 loans totaling $10,017,316.

Concreted Track

for New York City Subway

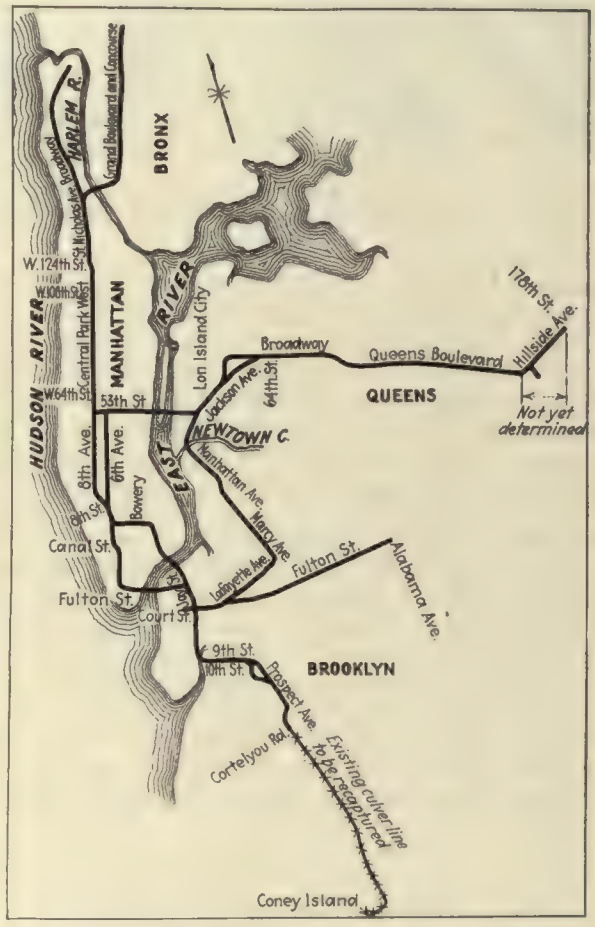
By Robert H. Jacobs
Division Engineer Board of Transportation, New York City

Extensive study led to the adoption on the new subway of wooden blocks set in concrete for the rail support except under special work. In this article the author outlines the numerous advantages of this type of construction

WHILE the fundamentals of all track construction are largely the same, from the pioneer work in the West to the present-day subways, tracks for rapid transit subway operation involve several aspects that are not entirely paralleled by steam railroad. Subway tracks are installed over a rigid floor instead of on a yielding subgrade and are not affected by frost and other climatic conditions, as is the case of open track on steam railroads. While provisions for drainage must be made, they are of an entirely different character from those usually required for other railroads. Likewise, the smaller temperature range in subways requires providing for less expansion in the rails, and motor-driven cars react upon the tracks quite differently from the driving wheels of steam locomotives. The fundamental requirements for subway tracks are in many ways quite similar to those for street railways, although there are obviously many points of difference both as to traffic and physical conditions to be met.

The rapid transit railroad system of Greater New York now under operation by the Interborough Rapid Transit Company and Brooklyn-Manhattan Transit Corporation consists of 216 miles of structure (subway and elevated) and 631 miles of track, exclusive of yards. The new independent city subway system was started in 1925 and, as at present laid out, consists of about 55 miles of structure and in the neighborhood of 175 miles of running track, exclusive of yards.

The contract drawings for the construction of the original subway (now operated by the Interborough Rapid Transit Company and known as Contract 1) indicated that in the underground portions of the railroad the track should consist of rails laid on a continuous bearing of wooden blocks, the blocks to be held in place by steel channels secured to metal crossties imbedded in concrete. This contemplated type of rigid construction required less depth below the base of rail than for ballasted track, and the subway structures were built accordingly. Although no such type of track had been used for high-speed railroads, a short stretch of it was installed and tested out under traffic on the Long Island Railroad. When the time came for laying the tracks in the subway the conservative attitude of the



Route of the New York City subway now under construction

operating company toward the adoption of this new type of track resulted in the final adoption of the ballasted type of track in place of that originally contemplated. This necessitated raising the base of rail to provide for ballast, thereby reducing the overhead car clearance. At the same time it permitted only a very shallow track construction with but 5-in. ties and 5 in. of ballast beneath the ties. On later work 6-in. ties with a $7\frac{1}{2}$-in. layer of ballast were adopted as the standard construction.

The tracks for the original subway and elevated railways (Contracts No. 1 and No. 2) were installed with 100-lb. modified A.S.C.E. rail, using ribbed tie plates pressed into the ties. The tracks for the elevated extension of the original subways were constructed somewhat similar to the existing Manhattan Elevated Railroad lines, except that 100-lb. modified A.S.C.E. rail



Ballasted track, known as type I, is used only for special work, for short stretches between special work, for lay-up tracks and in yards

was used instead of the 90-lb. special section in use on the Manhattan Elevated lines.

Prior to the preparation of track standards for the additional lines for the present operated dual system, conferences were held between representatives of the city and both operating companies. This resulted in the adoption of uniform standards except for certain items on which the two companies did not agree, the most important of which were the types of switches and the sizes of ties and guard timber for elevated railroads. Separate standards were therefore adopted where affected by these items for track to be operated by each of the companies. Housed switch points were adopted for Brooklyn-Manhattan Transit Corporation lines, and lapped switches for Interborough Rapid Transit Company lines; 6x8-in. ties and 6x6-in. outside guard timber were adopted for Brooklyn-Manhattan Transit elevated lines and 8x8-in. ties and 6x8-in. outside guard timber were adopted for Interborough Rapid Transit elevated lines.

After the completion of the original rapid transit system (Contracts No. 1 and No. 2) and prior to the installation of the tracks for the dual system, an interesting type of track construction had been adopted and installed in the Detroit River tunnels and in the Grand Central Terminal of the New York Central Railroad, as well as in the Pennsylvania Terminal and in a portion of the tracks of the Pennsylvania Railroad between the terminal and Long Island City, and also for portions of the Hudson-Manhattan Railroad. This special type of track, while differing somewhat in detail in the various localities, consisted essentially of short wood blocks imbedded in concrete for the support of the rails, with a trough between the rails. This type of construction was adopted by the city and installed at the stations of the dual system as well as in the Montague Street, Fourteenth Street and 60th Street river tunnels, where it proved so satisfactory that its use has been greatly extended for the new city subway system.

Track Standards for New Subway

For the new city subway it is planned to install concreted track throughout, except that ballasted track will be used for special work and for short stretches of track between special work, also for lay-up tracks and for tracks in yards.

The ballasted track, known as type I, is laid in a concrete trough, provided under the subway construction contracts for a planned depth of 7½ in., for ballast under the ties. Eighteen 6x8-in. ties to the 33-ft. rail and 7½x9-in. shoulder tie plates with cut spikes are standard construction. A view is given of a section of such track.

The concreted type of track, known as type II, is installed in a concrete trough identical with that provided for the ballasted track. The rail is laid on separate 6x10-in. creosoted wood blocks, spaced eighteen to the 33-ft. rail, imbedded in concrete to approximately the tops of the blocks, and sloping toward the center of the track for drainage. This construction provides a trough between the blocks and extending below the level of the bottom of the blocks. Screw spikes instead of cut spikes are used throughout. Tie plates are used with bosses to support the heads of the screw spikes so as to provide a space of $\frac{1}{16}$ in. between the flange of the rail and the underside of the head of the screw spike, as will be explained in more detail later.

In extending the use of concreted track it was realized that we were entering upon a program of the most extensive use of rigid track construction undertaken anywhere in this country. This decision was made after a careful study of the tracks of this character, which had been in operation for the last twelve years. During this period these tracks required practically no maintenance except rail renewals and the tightening up of track bolts. There is every reason to expect that this condition will continue for a great many years or until it is necessary to renew the ties.

Six Marked Advantages of Concreted Tracks

The advantages of concreted track are:

1. *More satisfactory drainage.* In our ballasted track, drainage is through the ballast into drain boxes connecting with a drainage system below the subway floor. With the concreted type of track, the greater part of the drainage is carried in the track trough, and it is only necessary to provide under drains in special cases where it is expected that the flow will be such as to make it undesirable to carry it all in the track trough, as well as in certain localities where the grades are very flat. When ballast is used, it soon becomes clogged and is therefore unsatisfactory for drainage purposes.

2. *Better riding qualities.* Due to the permanency of alignment and grade, continuous good riding qualities of the track are assured with resulting favorable effect upon the rolling stock.

3. *Better maintenance conditions.* In the case of subway tracks, the depth of ballast is necessarily limited, due to the large expense of increasing the depth of the subway, the standard depth being but 7½ in. under the ties, whereas in ordinary railroad construction, with ballast placed on an earth subgrade, the depth of ballast varies from 12 in. to 24 in. The frequency of train movements in subways and the constant tamping of ballast required to keep the track in surface and line causes a certain amount of stone dust, which, if allowed to accumulate, eventually blocks the drainage. This necessitates frequent renewals of stone ballast under very difficult conditions. The Interborough replaces ballast between stations about every ten or twelve years, and through the stations more frequently. This maintenance work has to be done during a few hours at night

with large gangs of men and with materials handled directly from work trains. All of this work is dispensed with in the case of concrete track. In many places there will be little or no flow of water, and the track trough of the concrete track provides a very convenient space for the storing of rail for renewals.

4. *Better sanitation.* Concreted track provides a surface that can easily be kept clean, whereas the filth and débris which accumulates in the ballasted track can be removed only by taking out the ballast.

5. *Safety.* From the point of view of safety this type of track has distinct advantages. The newspapers from time to time report that passengers fall off the platforms and are killed by passing trains. In several instances where such accidents occurred at places where concreted track is used, persons have rolled into the track trough and the trains passed over them without seriously injuring them. In the case of ballasted track, the distance from the under side of the cars to the top of the ties is so small that it does not allow a train to pass over a person.

With the concreted track it is possible to reduce to a minimum the number of workmen required to maintain the surface of the track. As a large number of men are required on the maintenance of ballasted track under operation, it is expected that the adoption of the concreted track will result in reducing very considerably the number of accidents to operating employees.

6. *Economy.* Concreted track, in providing for drainage in the trough between the rails, makes it possible to effect a large saving due to the omission of under drains, which with their manholes and connections require excavation, in earth or rock, below the subgrade of the structure at considerable cost. Taking this into account, the cost of concreted track has been estimated as being slightly less than for ballasted track. The labor cost of maintenance, however, is very much less for the concreted track according to our estimates, based upon the very conservative assumption that the wood blocks will not have to be renewed for 36 years. This makes concreted track much more economical than ballasted track.

Although it is believed that train resistance is considerably less on rigid concrete track than on ballasted track, no tests under rapid transit conditions have been made to substantiate this belief. A somewhat limited test on the Père Marquette Railway under steam road conditions over about 1,200 ft. of concreted track indicates a reduction of about 15 per cent in train resistance.



Concreted track, known as type II, is used generally throughout the subway. On curves of 500-ft. radius or less, four 7-ft. 5-in. cross ties to every 33 ft. of rail are substituted for an equivalent number of blocks



Tangent track on vertical curve

With the concreted track brought to proper alignment and grade, the wear and tear on the cars should be considerably less than is the case with ballasted track, which, even under the best conditions practicable, is more or less out of surface.

The adoption of separate wood blocks for the support of the rails was, of course, a radical departure from the standard railroad practice of supporting the two lines of rails on the same tie in order to assure the maintaining of the gage. This situation, however, is entirely taken care of by the backing up of the ties with concrete. On the earlier construction, 1-in. anchor bolts were placed at both ends of every tie block. These anchor bolts extended down into the concrete bed of the track construction. It has been shown from observation of the tracks over a period of twelve years under operation that these anchor bolts serve no useful purpose, with the possible exception of helping to anchor the ties supporting the guarded rail on sharp curves. In our present work anchor bolts are omitted except for the low side of guarded curves where they are provided to obviate the possibility of tight gage due to the pressure of the wheel flanges against the guard rail.

Long Life of Wood Blocks Expected

It has been realized from the first that every reasonable effort should be made to defer as long as possible the renewal of the wood blocks in the type II track. We have, therefore, endeavored to obtain blocks of the best lumber and creosoted them for longer life. By having most of the holes in the ties drilled before creosoting and by providing spikes of practically exact dimensions, we have minimized the effect of spike-killing. In addition, we have provided ties 10 in. wide instead of the usual 8 in., which makes it possible to plug spike-killed holes, shift the tie plates and drill new holes in the ties. We have found that to date with our 7½x9-in. tie plates, there has been very little tie plate cutting.

Although it appears that the time for the renewal of the ties is far distant, we have given this matter serious consideration. There is no question but that it will involve a large amount of work. In a few cases where reconstruction of this track has been necessary the blocks have been removed and replaced under traffic without serious difficulty and with satisfactory results. We have also constructed a considerable amount of concreted track under operation. In the event of general renewal it is expected that somewhat smaller ties will be used that can be placed in the grooves left in the concrete and secured in positions with grout or some asphaltic compound.

In general, regardless of ties and roadbed, there are

several types of standard construction based on curvature. They may be designated as follows:

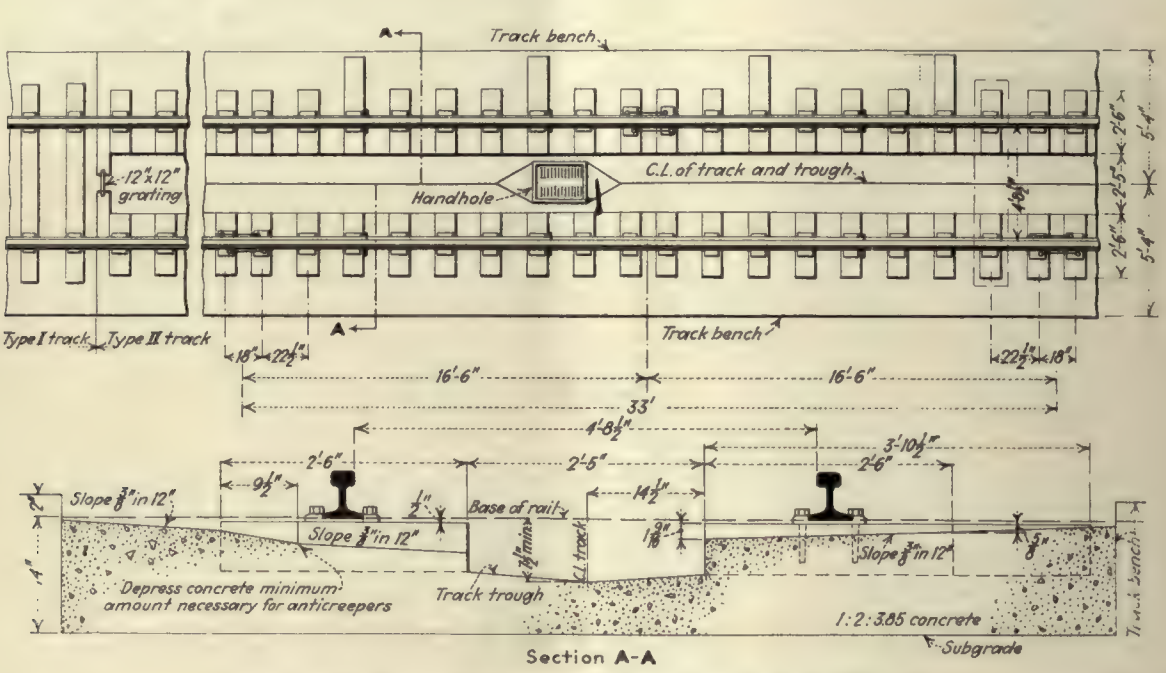
1. Tangent track and curves of more than 3,000-ft. radius. This track is installed in accordance with general practice, with 4-ft. 8½-in. gage and single spiked—that is, with one spike on each side of each rail.

2. Curves of from 3,000-ft. to 2,300-ft. radius. The only material difference in this type of construction from the above mentioned type is that an additional spike is installed on the inside of both rails.

3. Curves of 2,300-ft. to 1,000-ft. radius. Guard rails are installed adjacent to the gage side of low rail on all curves of less than 2,300-ft. radius, including transitions. The inside of the unguarded or outside rail is double spiked, while the running rail and guard rail on the inside of curves are single spiked. No rail braces are used on curves in this classification.

4. Curves of 1,000-ft. to 500-ft. radius. Rail braces are placed on the outside of the rails on the high side at every other tie on all curves of less than 1,000-ft. radius, and on the inside of guard rails at every third tie on all curves from 1,000-ft. radius to 500-ft. radius. The rail braces are spiked through the tie plates with three 1x5¾-in. screw spikes. On this type of construction we are providing extra tie blocks for the support of an additional rail toward the center of the track. The rail renewals on sharp curves are rather frequent and it has been found advantageous at the time of the first rail renewal to place the old rail inside of the guard rail. This rail is then bonded instead of the new rail, rendering it possible to make all future rail renewals without disturbing the bonds. This additional rail may have some advantage as an extra safeguard in case of derailment.

5. Curves of 500-ft. radius and under. This type of curve construction differs from that for 1,000-ft. to 500-ft. radius in that instead of installing rail braces on the guard rail at every third tie, they are installed at every other tie, and four 7-ft. 5-in. crossties to every 33-ft. rail length are substituted for an equivalent number of short blocks.



Type II roadbed on tangents and curves of 2,300-ft. radius and over

Law to Regulate Spray Painting Proposed

IN A BILL designed to apply to interstate common carriers and contractors working on federal projects, Congressman Zihlman of Maryland proposes to regulate the use of compressed-air spray-painting machines. Under the terms of the measure it is proposed that all persons required to use such devices be equipped with a breathing apparatus providing an uncontaminated supply of fresh air. It is also proposed that no person under eighteen be required to use a spray-painting machine, and that those permitted to use the machines be limited to a working period of not more than eight hours a day.

In way of a penalty, it is provided that all violations of the act shall be subjected to a fine of $1,000. In cases where it would be necessary for the operator of the spray-painting device to spray in the direction of a current of air or the source of the greatest amount of illumination, the bill would require that a turntable be provided for moving the object being sprayed.

Turkeys and Hams Awarded Again in Jacksonville

TURKEYS browned to a deep golden glow graced the Christmas tables of more than 100 employees of the Jacksonville Traction Company, Jacksonville, Fla., winners of two safety contests staged within the organization. Eighty-nine of the employees were trainmen. They operated cars 80 working days without a single chargeable accident. The remaining employees staged a record for maintenance of cars in the southeastern district of Stone & Webster, Inc.

Large juicy hams were also presented to eleven conductors, who performed their duties without having an accident charged against their record. Eighteen trainmen operated without chargeable accidents during the contest, but they did not work the required number of days. For that reason they were not rewarded.

Power Supervising Grows with Chicago Rapid Transit

Increasing concentration of traffic loads has made a system of power supervision economically advisable. It is also an important factor in the maintenance of good train service

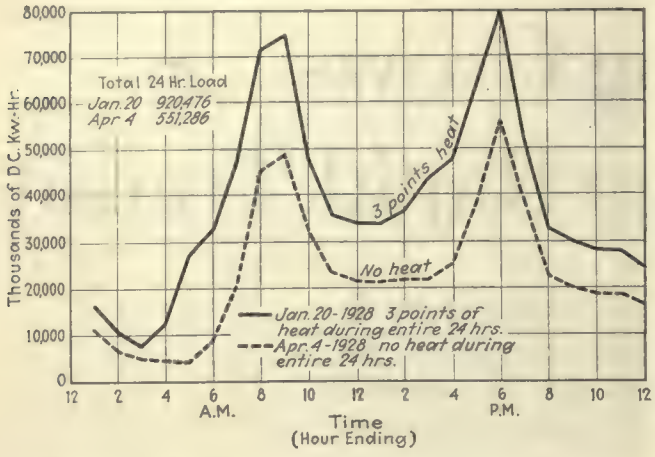


This electrically-operated feeder diagram is about 10 ft. high and 20 ft. long and occupies one entire side of the supervisor's office

TWENTY years ago, although the trackage which now constitutes the Chicago Rapid Transit system was not much less than it is today, the entire supply of power was from six sources, four of which were direct-current generating stations. With only one or two sources of feed for each of the separate railways, each of these sources supplied energy to all portions of its line at all times. It was only necesasry for the chief engineer at each of these power houses to know the variations in demand on his plant to put on or take off the necessary generators to handle it. At that time there was very little sectionalizing of feeders. This, of course, made it impossible to segregate trouble; either the railway was alive or it was dead.

Fifteen years ago the demands for power were such that several rotary converter substations and storage batteries were added to the two substations already used by the Lake Street division. A sectionalizing program commenced which split the feeds up into shorter sections and into single tracks. At that time there were fourteen sources of feed. The total number of feeder sections was twenty, and of feeder panels it was 41. Each division was still operating independently, the power house on each division was still the main source of feed and the substations and storage batteries were operated principally to maintain the best load factor at the power house.

In 1911 the operation of the elevated properties was



"Three-point" heat load and no heat load for 24-hour period of typical 1928 day on Chicago elevated lines

unified and a consideration of the operating problems under a unified management indicated that considerable advantage could be gained by combining power systems rather than handling each division separately as heretofore. In the following year a power contract with the Commonwealth Edison Company was concluded, and the way cleared for the addition of sources of feed which by this time were badly needed. A further program of sectionalization was entered into, working toward an eventual scheme of a section for each single track, averaging about 2½ miles in length. In 1912 one substation and 22 additional feeder panels were added; in 1913 three more substations and twenty more feeder panels. Some of these points of feed were, of course, required only during the morning and evening rush hours. During the balance of the day the power house, with some additional help, was able to handle the load and maintain adequate line voltage at all points on the system.

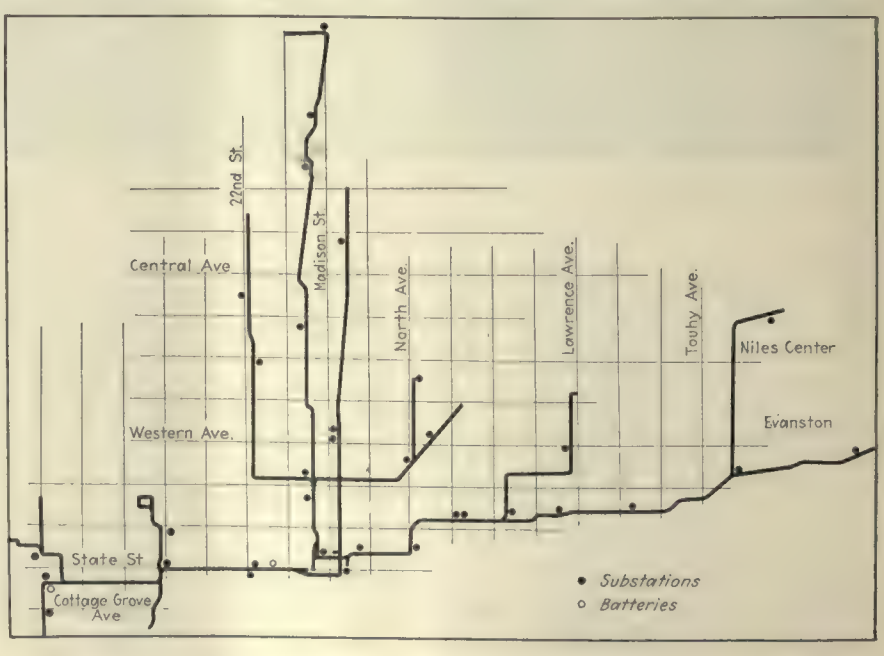
The number of sources and the number of feeder sections were increasing so fast and the layout was getting so complicated that the power house staffs were no longer able to handle them properly. The interchange of energy between divisions, each of which had its own power house staff, was difficult to handle under the existing conditions. Even if normal operation could have been handled properly, special switches in case of trouble could not be co-ordinated between five separate authorities. It became apparent that an organization was needed whose primary duty it would be to handle this more and more complicated switching situation. For this reason a power supervisor was installed in an office in the Loop, and the existing power house and substation operating forces were instructed that in the future they would be under his orders and would control their operation and switching solely at his direction.

At the present time the Rapid Transit system is served by 36 sources of power, rotary converter substations, two mercury arc rectifiers and several storage batteries. The system is separated into 77 feeder sections. The majority of these sections are connected into at least two sources of power and in some instances more. There are a total of 174 feeder panels. Energy consumption has grown from 114,000,000 kw.-hr. in 1905 to more than 210,000,000 kw.-hr. last year. The maximum demand, which in 1913 was 37,500 kw., last year reached 76,000 kw. and the greatest one-hour demand was more than 85,000 kw.

The load has two very marked peaks, from 7 to 9 a.m. and from 5 to 6 p.m. on each week day. The demand in the summer varies from 3,500 kw. in the middle of the night valley to 50,000 kw. in the morning peak, then drops to 23,000 kw. in the mid-day valley and goes up to 55,000 kw. in the afternoon peak. The annual load factor based on the maximum demand is about 40 per cent. In winter the electric heat used on the cars, and which amounts to about 15 kw. per car when all is in use, increases the maximum demand and kilowatt-hour consumption during its use by about 50 per cent over the summer condition. The amount of energy actually used for electric heat is about 15 per cent of the total used in a year.

During the rush hours every source of power is used. During winter practically 100 per cent of the connected converter capacity is required to supply the peak demands. In the summer peaks, while the total capacity is not necessary, load concentrations are such that all sources must be in operation to maintain line voltage necessary for good train operation. These demands taper off into the medium valley in the middle of the day and the very low valley in the middle of the night. It is not only uneconomical to operate rotary converters at low loads, but the interconnection of substation over the very heavy feeder systems when there is little or no load is dangerous. To take care of this condition necessitates switching operations to vary the condition from fifteen sources of feed utilized in the valley to the full number utilized in the peak. Not only are substations put on and taken off, but feeder section switching is done varying from 80 feeder panels closed in the valley to 130 closed in the peak.

This normal switching, to follow the changing loads, includes more than 100 normal changes every day, all of which are made on orders from the power supervisor.



Chicago Rapid Transit substation locations

His telephone facilities have grown from the three instruments with improvised connections which obtained in the beginning to a switchboard equipped with private lines to each source of feed, together with a sufficient number of trunk lines, outside lines, and private lines to the load dispatcher of the Commonwealth Edison Company and the system operator of the Public Service Company of Northern Illinois. A recent check of the amount of business over this switchboard showed about 500 telephone calls per day in normal business, or an average of a call every three minutes throughout the 24 hours.

The power supervisor's diagram has grown from a pencil one on a drawing board to an electrically operated diagram about 10 ft. high and 20 ft. long which fills one entire side of his office. This diagram includes a representation of the railroad system and of individual feeder sections in colors, together with their numbers. It has a frame for each source of feed, with sub-frame for each feeder section which can be fed from that source. Each source and each feeder section frame have a red and green pilot light. The red light indicates that the station is in operation or the feeder closed. The green light indicates that the station is shut down or the feeder open. Up to the present time the majority of these indications are controlled by a plug jack system in the power supervisor's switchboard, and the indications can be changed upon receipt of telephone information without it being necessary for him to leave his desk.

A few of the indications are operated by a supervisory control system and automatically indicate any change which may occur. This system not only furnishes automatic indication but actually gives the power supervisor control from his desk of the machines and the feeders at such stations. Seven locations are so equipped at the present time, four of them automatic substations and the others tie breaker locations. A turn of the proper key located in front of the power supervisor is sufficient to perform whatever operation he wishes, and the indication of its actual performance automatically shows up on his diagram within a few seconds.

This supervisory control is of the utmost assistance in handling power and while it is used as yet only at stations where no attendant is located and where it would not be possible to get this information in any other way, it will probably be extended eventually to many of the feeders at manually-operated substations. The savings in seconds of getting an automatic indication at once rather than waiting for an operator to restore interrupted service and then report by telephone is of immense value.

The power supervisor also acts as a trouble dispatcher. All cases of trouble in distribution system or lighting are reported to him, and the maintainers who are on duty constantly on each division of the road report to him by telephone. Each case is entered on the record sheet and assigned to the proper maintainer for necessary repair work, and when the repair work is completed checked off with the proper notations.

Several of the power supervisors are employees of twelve years' standing or more. All of them have had substation operating experience and all of them are familiar at first hand with the properties of the Rapid Transit System.

Records available in the office contain everything that is necessary for power control, including complete information as to cable sizes, connections and locations, switches, switchboard buses, wiring diagrams, etc, all of it in such shape that instant reference can be made.

C.E.R.A. Sees More Prosperous Times Ahead

New money, modernized equipment, improved methods of passenger and freight handling contribute to better business relations with public

ELECTRIC railways can claim no vested right in transportation. Whenever a new form of public carriage can transport the people or products of the country more conveniently, expeditiously, and more economically than can the present systems, the public is entitled to such new form of transportation, declared J. P. Barnes, president A.E.R.A., in addressing the opening session of the Central Electric Railway Association in Indianapolis last Thursday. Mr. Barnes stressed the paramount importance of convenience of service and detailed the principal factors involved in rendering such service. There was a time, he continued, when in considering the convenience and necessity of a mode of transportation the emphasis was placed on the latter, a time when the service as such was justified on the basis that it fulfilled a need of the community. If electric railways are to continue operation in the face of competition from automobile and bus, it must be because their efforts are directed toward rendering convenient as well as necessary transportation. It must be made easy for patrons to use the passenger and freight-handling facilities of electric lines.

There are many encouraging indications, said W. S. Rodger, general traffic manager Eastern Michigan Railways and president C.E.R.A., in summarizing the progress of the electric railway industry in the central territory during 1928, that the industry is surmounting the difficulties which have beset it. With new methods of operation and equipment all possible economies in capital outlay and operation must be exerted to keep rates at a minimum for the transportation of passengers and freight. A great deal has been accomplished in operating economies, but more can be done by the maintenance of rigid supervision over all items of expense and by introducing so far as possible labor-saving devices, curtailing unnecessary train mileage and exercising every economy that can be practiced without detriment to the service.

In Mr. Rodger's opinion, jitney competition, which for a while caused much difficulty, is being eliminated as communities learn it has no legitimate place in modern transportation facilities—that it only tends to cripple, if not destroy, regular transportation agencies. Referring to the competition of the long-distance bus lines, he said, this type of competition could be met by the electric railways only by giving similar accommodations and rates of fare by operating through cars over the most direct routes and on limited train schedules. It was not apparent, he continued, why electric railways should sit still with their facilities not fully occupied and watch the buses absorb most of the so-called day-coach traffic which is moving and also create a lot of new business through the medium of low fares and through runs over publicly-furnished highways.

If all laws dealing with industrial problems had as their aim the restoration of economic freedom there could be no serious objection thereto, declared R. N. Van Doren, vice-president and general counsel Chicago

& Northwestern Railway, in presenting an analysis of governmental regulation as related to economic law. In Mr. Van Doren's opinion, regulation of private as well as public business is being enlarged unjustifiably, and no one can forsee the extent to which the movement will go, if an intelligent and forceful influence is not exerted to direct the leaders of industry and of politics back into the natural channels of economic thought. Mr. Van Doren's paper is published in abstract elsewhere in this issue.

Service the Only Commodity the Railways Have to Sell

Variable operating costs, within the control of electric railways, are determined, in a large measure, by the number of car-miles and car-hours operated, declared Joe R. Ong, transportation engineer Cincinnati Street Railway, in discussing the elements of traffic analysis and schedule making. In order to live the electric railway must give service, for that is the only commodity it has to sell. In order to prosper it must give good service. The right amount of service, in the right place, at the right time is the objective to be sought. Correct schedules can show profitable operation on a given fare and satisfy the public with adequate service. The four principal elements comprising adequate service, according to Mr. Ong, are:

1. Sufficient cars to handle the traffic.
2. Cars operated frequently enough to serve a reasonable convenience.
3. Adherence to schedules.
4. The speediest operation consistent with safety.

In a paper dealing with the management problems of electric lines, C. T. Dehore, president Indianapolis & Southeastern Railroad, summarized the factors which, accumulating over many years, have complicated the satisfactory operation of railway properties, and cited the experience of his own company to substantiate the practicability of new equipment and new methods in securing profitable business.

The trend in the development of pick-up and delivery freight service was analyzed in some detail by L. G. Tighe, assistant general manager Northern Ohio Power & Light Company. The problem, according to Mr. Tighe, has been and still is to co-ordinate the movement of less-than-carload freight shipments to give a complete service from consignor to consignee. In other words, in addition to handling merchandise by rail from one terminal to another, to embrace also the handling of this merchandise from the door of the man who ships to the door of the man who receives, and to handle this shipment as one complete transaction.

Too Much Lost Motion

Under the present system there are too many fingers in the pie, too many people among whom to divide the responsibility, too much lost motion and too little efficiency. This is all very expensive and adds to the cost of every commodity transported. The short-distance truckers have solved it to a certain extent. It is fine transportation service when a truck can back up to a man's door, load his goods and deliver it to the door of his customer in a neighboring city, or in cities say within a radius of 100 miles, but that does not answer the whole question and it does not take into consideration the rail carriers which are, when all is said and done, the backbone of the country's transportation system.

There are places where trucks have certain advantages and will do the job more economically than the rail lines. In those situations the trucks should have the business. Commodities should be handled always in the most efficient manner, i.e., at the least cost consistent with the class of service desired. Fast movements should be more costly than slow movements, where the fast movement is of a special nature requiring individual attention. There are certain kinds of shipments, however, that can be more economically handled by rail lines. Electric railways fit into the picture in several ways. They have the bulk capacity of the steam roads and the rapidity of movement of the truck for short and medium distances. They need only to co-ordinate the rail and the truck to present to the shippers in their territory a service that will have all of the advantages of both.

Continuing, Mr. Tighe pointed out that men in long-distance truck service realize and appreciate the advantage held by the electric railway lines. They realize that electric lines can beat their costs on account of bulk handling ability and that bulk freight can be handled more cheaply in a train of three 40-ton cars than they can in a caravan of trucks and trailers. The truckers' advantage comes only in their ability to collect the goods at the shipper's door and make delivery at the door of the receiver of the goods. The railways' problem is to devise ways and means of co-ordinating these functions so as to obtain the maximum advantages of both types of service.

Advantages in Consolidating Freight Facilities

The advantages to be derived through consolidating the freight facilities of otherwise separately operated interurban electric railways were presented in a paper by D. R. Thomas, president Electric Railways Freight Company of Cleveland. Methods were discussed whereby the benefits of consolidation among the electric railways would be obtained without actually consolidating either the corporations or the physical properties of the systems involved.

The new system of color light signals on the Chicago, South Shore & South Bend Railway was described in some detail by B. L. Smith, superintendent of signals, who supplemented his presentation with a number of lantern slides. Color light type signals, he summarized, make for better train service. They are positive in action, economical in operation and free from mechanical defects. Trains operate on an average of from 93 per cent to 95 per cent on time since the installation of the signals on the South Shore lines. Signal failures have been reduced from 50 per day with the semaphore type to almost none with the color light type.

Reports of committees and of the activities of the three affiliated associations—Master Mechanics, Accountants, and Traffic—preceded the election of officers.

L. M. Brown, vice-president Interstate Public Service Company, was elected president; L. G. Tighe, assistant general manager Northern Ohio Power & Light Company, first vice-president; R. R. Smith, receiver Chicago, South Bend & Northern Indiana Railway, second vice-president; L. E. Earlywine was re-elected secretary-treasurer. Ralph W. Emerson, general manager Cleveland Railway, and C. T. Dehore, president Indianapolis & Southeastern Railroad, were elected to fill vacancies in the executive committee.

Michigan City, Ind., was selected for the June 27-28 meeting of the association.

American Executive Committee Meets in Indianapolis

PROGRESS on the program for the next convention of the American Electric Railway Association, to be held at Atlantic City, was reported to the American executive committee at a meeting of that body held in Indianapolis on Jan. 25, 1929, in connection with the annual meeting of the Central Electric Railway Association. A complete outline of the program and a list of the tentative speakers selected was presented by E. P. Waller in the absence of Chairman T. A. Kenny of the committee on subjects and meetings.

Every assurance of a successful convention was given by the broad scope of the subjects selected by the committee and the national prominence of the speakers who will be invited to address the convention. In addition to the morning meetings of the American Association, a series of informal luncheon conferences, similar to those which have proved so popular during the past several years in Cleveland, will again be included. The actual drafting of the program for the American meetings was in the hands of Sub-Committee Chairman H. C. Clark. The luncheon meeting program was prepared under the direction of Sub-Committee Chairman H. V. Bozell. These tentative plans were enthusiastically approved by the executive committee. President J. P. Barnes expressed his appreciation of the work of the program committee and pointed out that every promise of a successful convention is offered by the subjects and speakers selected.

One major change in the schedule of events is to be made this year. The American program will open on Monday morning of convention week, but the afternoon of the first day will be set aside for the inspection of exhibits. The American program will then continue on Tuesday and Friday mornings, with Wednesday morning again reserved for the inspection of exhibits. In this way exhibit day will be split between two half-day periods, one in the afternoon at the beginning of the week, and one in the morning between the second and third American sessions. By this arrangement the affiliated association sessions, starting on Tuesday afternoon, will not be interrupted by the interposition of exhibit day. It is hoped that this will enable members of the affiliated associations who only have a limited time available for attendance at the convention to attend all of their affiliated association sessions. Another purpose in splitting exhibit day is to discourage the use of this time for other purposes than that for which it is set aside —actual study of the instructive exhibits that are brought to the convention by the manufacturers.

Other reports of standing and special committees submitted to the executive committee included that of the finance committee by C. E. Morgan, chairman; national relations by J. H. Hanna; publications by C. E. Morgan; exhibits by J. H. Hanna; entertainment by Samuel Riddle; manufacturer contact by E. B. Meissner in the absence of E. F. Wickwire; co-operation with state and sectional associations by J. W. Welsh in the absence of Chairman Frank Coates; insurance by H. B. Potter; taxation by Leslie Vickers in the absence of Chairman H. L. Geisse. A report for the Accountants' Association was made by President O. H. Bernd, and for the Engineering Association by Vice-President C. H. Jones.

In reporting for the finance committee Chairman Morgan called attention to the healthy condition indicated by the fact that payment of dues by operating members is ahead of the schedule of last year. On national relations, Chairman Hanna said that efforts to obtain passage of the new Parker bill for the regulation of interstate buses, which was prepared through the co-operation of all agencies interested in this subject, are being made at this session of Congress. Mr. Hanna also announced that a committee representing the National Association of Railroad and Utility Commissioners and the Interstate Commerce Commission is being formed to study the electric railway situation with a view to determining the need for a modification of the transportation act with respect to electric railways.

L. M. Brown, newly-elected president of the Central Electric Railway Association, expressed the appreciation of his organization to the American Association executives for their co-operation in holding their committee meeting in Indianapolis.

The time and place for the next executive committee meeting were set for 10 a.m. at association headquarters in New York on March 22, 1929.

Seventh Coffin Award Contest Announced

CIRCULARS of invitation announcing the seventh annual contest for the Charles A. Coffin Award have been sent to all electric railway executives, accompanied by personal letters from President James P. Barnes of the American Electric Railway Association, who also is chairman of the Coffin Prize committee. In his letter Mr. Barnes suggests that, since the executives of every electric railway company at this time review what has been done and prepare their final financial summaries, it would not be a great burden to them if each and every company in reviewing its accomplishments followed the form suggested in the circular. It would, he says, be a boon to the industry.

The award is given by the Charles A. Coffin Foundation, established by the General Electric Company, to "that electric railway company within the United States which during the year has made a distinguished contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry." The award consists of a gold medal to the company and $1,000 in cash to the company's employees' benefit association or similar organization.

It is suggested by the committee that a chapter arrangement be adopted for the briefs and that the accomplishments be outlined in narrative form, accompanied by such figures, illustrations and exhibits as are necessary to support the claims made. To reduce cost it is suggested that decorative art work be avoided. The committee prefers a simple statement of the facts as concisely as possible without the elimination of essential details, and with a minimum of repetition under the various factors outlined in the invitation. The subject matter to be included in the several chapters is outlined as follows:

An introduction.—A statement of the company's broad program and a summary of why the accomplishments on the property constitute a contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry. If there has been some important development originating on the property which is entitled to special consideration a description should be given. There should also be a summary of

the company's operating and financial statements reduced to a unit basis, covering the period of twelve months ending Dec. 31, 1928, in comparison with the corresponding periods for the preceding five years. This should include the financial and operating statistics covered by the A.E.R.A. regular statistical form.

I. *More riders and more revenue.*—The initiative, skill and enterprise manifested in popularizing electric railway service and in meeting the competition of private automobiles by improvement of the service rendered, and by the use of merchandising methods for selling this service.

II. *A friendly public.*—Success in winning the co-operation of the public, together with the methods employed. If possible, concrete evidence should be shown. Success in winning relief from unfair franchise conditions, inflexible rates of fare, paving burdens or excessive taxes will be considered evidence of a better understanding by the public of the value of the company's service. The value to the industry of the methods and principles successfully adopted on the property for improving public relations will be given particular weight.

III. *Lower costs and increased reliability of service.*—(a) Economies effected resulting from original ideas or application of ideas originating with others, including improvements in accounting or record keeping which permit closer supervision or better control; (b) improved engineering, construction or maintenance practice originating on the property or successfully adopted from the ideas of others.

IV. *Increased safety for riders, employees and the public.*—Development or application of ideas for increasing safety, and success obtained in actually reducing accidents.

V. *Co-operation between management and employees.*—Progress made in building an improved *esprit de corps,* in better qualifying employees for their work and in training them as salesmen of the company's service.

VI. *Financial accomplishments.*—Readjustment of the financial structure, or other measures which tend to improve the company's credit and reduce the cost of new capital.

Presentations must cover accomplishments during the calendar year 1928, although a definite program extending over a period of years and showing its first notable results during that year will be considered. All presentations must be in the committee's hands at association headquarters, 292 Madison Avenue, New York City, on or before June 30, 1929. Submission of a presentation carries with it to the committee the privilege of publication in whole or in part over the name of the company. If desired a company may mark certain parts as confidential and these will not be published without permission, although they must be available for reference at association headquarters to anyone desiring to study them. The award will be announced at the annual convention of the association in Atlantic City during the week beginning Sept. 28, 1929.

London Tape Recorder Faster Than Telephone

FOR a great transportation concern like the London Underground, it is highly desirable that important news should be made available to all interested parties without the loss of time and possible inaccuracies due to hasty and multifarious telephoning.

Since Aug. 13, 1928, the Underground has been making use of the Exchange Telegraph Company's tape and column printing instruments, widely known in Great Britain for the transmission of news and stock market quotations. The purpose of this tape recorder is to give urgent information simultaneously to any desired number of stations from a central office. The printing of the message is a great advantage. For example, after the chief dispatcher at Earl's Court has telephoned a message to the transmitting station at Leicester Square, he can see almost immediately from the printed record whether the message is being correctly distributed.

At present, the transmitter communicates with eighteen statistical points. These include six receivers in the general offices, two in the control (dispatching) offices, four in the rolling stock department, and one each in various departmental offices, as well as in the power station. Arrangements have also been made for a similar system on the lines of the associated tramway companies.

The Underground Railways installation is rented for £305 ($1,482) a year, based on £35 for the transmitter and £15 each for the receivers. These costs are exclusive of wiring.

To secure greater efficiency from the installation, the company has devised a series of abbreviations to cover the names of the various routes and the more common items likely to appear on the tape. The accompanying table shows the abbreviations used.

KEY TO ABBREVIATIONS OF LONDON TAPE NEWS TRANSMISSION

LINES AFFECTED

D	District	B	Bakerloo
C	City	P	Piccadilly
CL	Central London	H	Hampstead

DIFFERENT CLASSES OF FAILURES, ETC.

CF	Current failure
CO	Train changed over
DT	Defective train
NO	No rolling stock available, trip canceled
OS	Train taken out of service
PF	Point (switch) failure
SE	Staff error
SF	Signal failure
T	Traffic
TF	Track failure
X	Passengers detrained
EB	Eastbound road
WB	Westbound road
NB	Northbound road
SB	Southbound road

Thus, a message may come over the tape like this:

B. DT. No. 20. 6.40 p.m. Oxford Circus NB. 6 min. X 200 OS. Queens Park NO.

Translation or decoding of the foregoing abbreviations reveals the following story:

Bakerloo Line. Defective train No. 20. 6.40 p.m. Oxford Circus northbound road, six minutes delay. Two hundred passengers detrained. Taken out of service Queens Park. No stock available to replace.

The abbreviations "ety" and "acc" will also be observed on the tape reproduced, these meaning "empty" and "accumulated" (delay) respectively. Continuity of the messages transmitted throughout the day is maintained by numbering each item.

Observation of this recording system at work revealed another superiority over the telephone, namely, the executive in whose office a receiver is placed has the advantage of reading the log of the day for several hours back to cover periods when he was out. The possibility that important operating messages will be overlooked or be garbled in reception is thus avoided. The complete tape covering the day's work presents a valuable and permanent record of operation.

Railway Publishes Boarding House Guide

FOR several years past the transport department of the city of Edinburgh has published a book containing a list of apartments and general boarding facilities available for visitors. Persons wishing to advertise their lodgings are listed in the guide on payment of 1 shilling (24 cents) per entry. The guide also carries facts about the various transportation services, prominent buildings, parks, theaters, golf links and other matters that would be likely to interest the stranger. Advertising is included, and the guide is sent post-free to all inquirers.

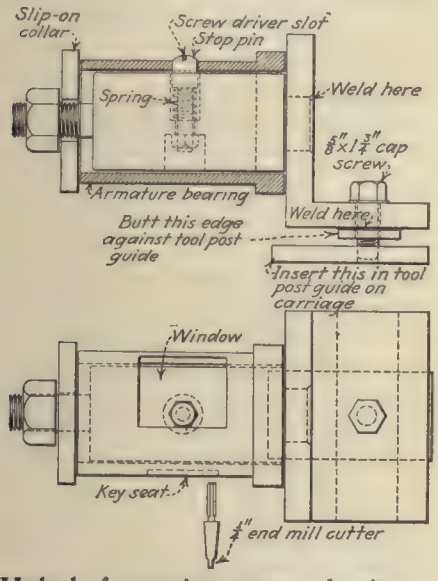
Maintenance Helps That Have Proved Valuable

Key Seats for Armature Bearings Milled in a Lathe*

By Charles Herms

General Foreman
San Diego Electric Railway,
San Diego, Cal.

BECAUSE the shops of the San Diego Electric Railway are not provided with a key seater or milling machine, key seats are cut in armature bearings on a lathe. This method



Method of mounting armature bearing so as to cut key seats in a lathe

has been found less expensive than that of cutting them on a shaper. An accompanying sketch shows the set up used for cutting key ways.

A jig is mounted on the lathe tool post carriage. The stop pin on the jig engages in the window of the bearing and serves to locate the key way in the correct position. The bearing is given a left turn until the edge of the window strikes the stop pin, and the slip-on collar is then dropped into place. By a few turns of the clamping nut the slip-on collar is clamped firmly against the bearing, so as to hold it rigidly during the milling operation. The nut is never removed entirely from the jig because the slip on collar is slotted so as to drop over the threaded stud on the jig.

By manipulating the lathe lead screw the entire assembly is moved into the end milling cutter. A stop is provided on the carriage so as to allow the milling cutter to cut the key seat to the exact depth needed. Then, by using the cross feed screw, the carriage is moved in and out for the correct length of the key way. Stops are provided on the cross feed of the carriage to limit this movement. The end milling cutter is chucked in the lathe chuck.

After the set up has been completed key seats can be cut in bearings at an average rate of twelve minutes each. The entire unit is mounted on the carriage instead of on the tool post. The method previously used for cutting key ways required a shaper and took a machinist an hour to make the set-up and cut the key way. With the new jig, when the set up has once been made, a helper can do the machine work.

*Submitted in Electric Railway Journal Prize Contest.

Outdoor Storage Arrangement Speeds Shop Work

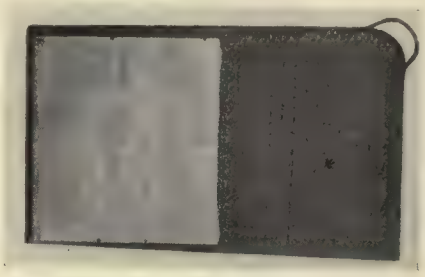
CARE and thought in the outdoor storage of material has facilitated work in the shops of the Staten Island Rapid Transit Railway, Staten Island, N. Y. The storage space is enclosed by a high wire fence, and on all four sides of the space bins are provided for small parts. Brakeshoes, third rail shoes and other heavy items are piled neatly on raised platforms, a large number of which have been built. Broad aisle room has been provided for hand trucks, and the entire space is effectively drained. A section of the outdoor "storeroom" is shown in the accompanying illustration.



Systematic storing in outdoor space speeds production in Staten Island shops

Metal Under Rattan Saves Seat Backs

DESTRUCTION of rattan-covered seats by cutting with a penknife reached such a stage in Omaha that the Omaha and Council Bluffs Street Railway decided some effective measures were necessary. To overcome this difficulty, a sheet of No. 22 gage galvanized metal has been placed beneath the rattan covering on the rear side of the seat back. Knives which once cut easily through the yielding rattan now find the going so rough that this sort of destruction has been practically eliminated.



Pocket knives fail to make progress against rattan-covered seat backs when these are underlaid with light sheet metal



A lamp for illuminating fare box can be seen just above the fare box bracket

Convenient Light Installation for Fare Boxes*

By E. M. Lunda

Superintendent of Shops and Equipment, Grand Rapids Railroad, Grand Rapids, Mich.

BIRNEY cars operated by the Grand Rapids Railroad have been rebuilt to provide inclosed cabinets for the control and brake equipment at the front end of the cars. Fare boxes are installed on a pipe bracket projecting out from the control cabinet. To illuminate the fare boxes when installed, a standard 23-watt lamp is mounted inside the control cabinet, so as to be flush with the outside surface. The lamp is painted all over, except for a circle of ¾-in. diameter at the very tip. This allows a small beam of light to be thrown directly on the inspection plate on the fare box.

Oil Reclaiming Equipment Reduces Oil Purchases*

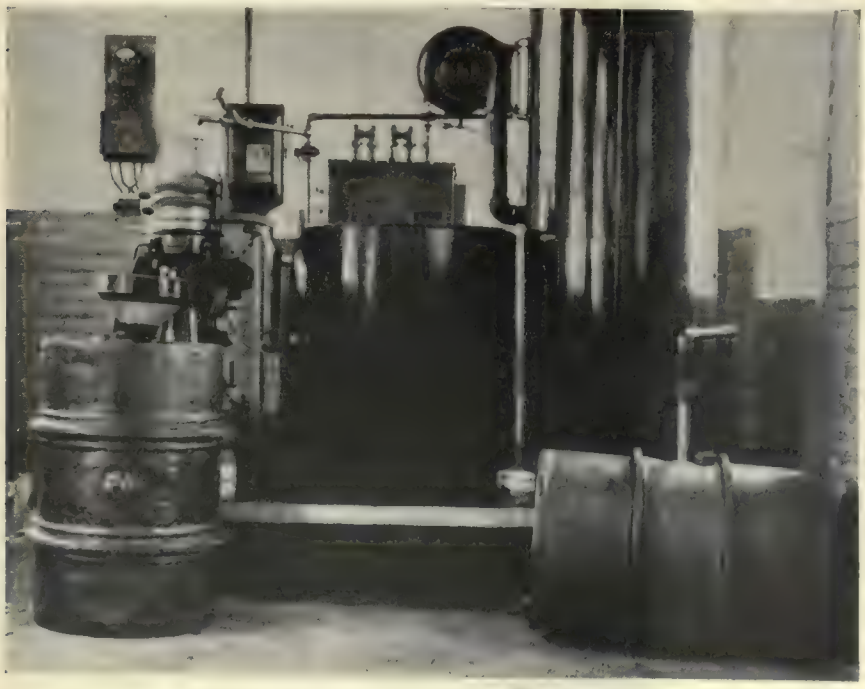
By C. B. Hall

Chief Clerk Mechanical Department, Virginia Electric & Power Company, Norfolk, Va.

RECLAMATION of lubricating oil for bus engines by the Virginia Electric & Power Company, Norfolk, Va., has produced noteworthy economy. The consumption of oil by buses of this railway averages 1,500 gal. monthly. The oil is drained and replenished every 3,000 miles. The reclamation equipment includes a De Laval separator, together with some other necessary apparatus. Three motors operate the heater and blower assembly, the pump and separator.

A new fireproof building, immediately adjoining the bus garage, houses the reclaiming equipment. Although this has been in operation only a short time, 14 days' operation produced 540 gal. of reclaimed oil. The approximate cost of running the machine has been estimated at 33 cents per gal. It is expected that this equipment will effect a saving of approximately $2,000 per year.

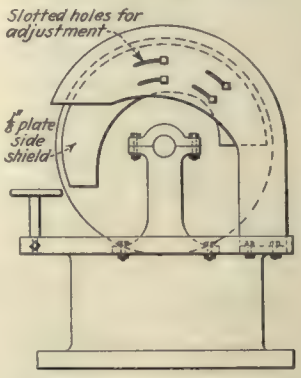
*Submitted in Electric Railway Journal *Prize Contest.*



The drum at the right contains used oil, which is sucked into the reclaiming machine vat, while the drum standing upright to the left receives the finished product

Shield to Prevent Side Grinding on Emery Wheel

NUMEROUS emery wheels were destroyed in the shop of the Richmond Railways, Staten Island, N. Y., because certain employees habitually used the side of the emery wheel for certain grinding operations. This side grinding was the primary cause of a number of rather serious accidents. To avoid this trouble each wheel has been equipped with side shields, as shown in the accompanying sketch. This shield is made from ⅛-in. plate, circular in form and fastened to the wheelguard. The supporting holes are slotted so as to permit adjustment of the shield as the diameter of the wheel is decreased.



Since this shield has been installed accidents due to side grinding have ceased

Keeping Lantern Wicks From Hardening*

By John L. Spencer

Foreman Duluth Station, Twin City Line, St. Paul, Minn.

TRAINMEN of all suburban lines use lanterns for flagging a car following in case of a trolley break or other obstruction. Trouble is experienced frequently due to the lanterns going out, even though the best oil is used, as the wicks harden.

To overcome this trouble a method has been used at the Duluth Avenue Station in St. Paul on the St. Paul & Stillwater lines for the past six months, which has proved satisfactory. Lantern oil cups are filled with dry cotton. Kerosene is then poured in the cup until it is full, and the excess kerosene then poured out, leaving the cotton saturated. A hole is made for the wick in the cotton with the finger, and the wick placed in position and the holder screwed on.

News of the Industry

Big Business a Builder

Owen D. Young discusses the aims of industry. Finds fraud dwindling, but fears errors of judgment

SPEAKING on Jan. 20 in the pulpit of the Park Avenue Baptist Church in New York, Owen D. Young voiced his belief in the aims and development of "big business" and its growing moral aspects and forces. Dishonesty in business, he argued, is exploited in the press because it is unusual, so that the dishonest man is less to be feared than the honest man who makes mistakes in judgment.

On the other hand, uprightness must exist in the great business organizations of the day "on the simple ground of expediency," since modern industry has made its managers trustees, responsible not only for its material welfare but for its moral conduct as well.

Among other things Mr. Young said:

In 1905 there came round the bend, a thing known as Big Business. The roads weren't fitted for it. The drivers were quite unskilled. Dire prophecies were indulged in as to what would happen if large business units were to be permitted. It was said the masses of the people would become enslaved. But in fact it has turned out that these big organizations have become the servants of the masses—not their masters. The business machines have become better adjusted through a quarter of a century. The drivers of them have become skilled. They are, in a sense, people trained for the job, like motor-car drivers. And while we still have some reckless and irresponsible ones who are a menace to the road, by and large we manage motor cars by the millions with amazing skill and safety.

So our big business is no longer feared by the people. Exploiters no longer own the big concerns. Bankers no longer own them. Their shares are spread from one end of the country to the other. Broadly speaking, the vast organizations are in skilled hands and the road is reasonably safe.

The danger comes not from bad men or bad principles, but from the difficulty of applying right principles to increasingly complicated situations. Our greatest risk is in the mistaken judgment of good drivers where the traffic is heavy and the signals are complicated.

Mr. Young said that in principle the Golden Rule is all that a business man needs as a guide. He continued:

Yet if you ask me to apply the Golden Rule to a bank rate, I find it amazingly difficult to do. It is like telling me to apply the multiplication table to the design and manufacture of a steam turbine. What is right in business requires that the Golden Rule be applied by men of great understanding and knowledge as well as conscience in highly complicated situations. They must be as highly skilled as the turbine engineer who makes the connection between the multiplication table and the modern high pressure turbine.

I purposely omit from this discussion the immoral things done in business by weak and dishonorable men. Whenever these occur they are exploited in the headlines of the newspapers, not because they are the common thing but because they are the unusual thing.

During the last 30 years the moral standards of business have advanced. A storekeeper might short-measure or short-change his customer. He might even induce his clerk to short-weigh and short-measure, but he could not organize a vast department store on that basis. Either his employees are honest people who would refuse or he would soon have as employees a vast organization of crooks who would beat each other and soon ruin the proprietor himself. Big business does not lend itself readily to dishonesty and crookedness.

Mr. Young feels that as time goes on the right in business will more and more prevail. The larger business becomes, the more scrupulously careful the administration of it will be. There has been much difficulty with questions of technical competence and moral responsibility in the offices of Aldermen, but there has been practically none in the great office of President of the United States. Mr. Young said:

Somehow, as responsibility increases, men are found big enough to meet adequately the great questions of right and wrong which come to them. So I welcome big business and big responsibilities, not in the fear that it will make business wrong, but in the hope and belief that it will make business right.

Higher Fares in Twin Cities

Chairman dissents from opinion authorizing 10-cent cash fare with six tokens for 45 cents. Company entitled to 7½ per cent return

AN INCREASE in the rate of fare for the Minneapolis Street Railway and the St. Paul City Railway was ordered by the Minnesota Railroad Warehouse Commission on Jan. 25. Effective at midnight on that date the fare was changed from 8 cents cash and 6 tokens for 40 cents to 10 cents each and 6 tokens for 45 cents. Transfer arrangements are unchanged. As regards Minneapolis the decision is final following a hearing. In St. Paul it follows a stipulation entered into by the city, company and commission on the ground that "in the circumstances it would be manifestly unfair to the users of the railway service in Minneapolis to permit a higher fare to be charged and collected in that city than at the same time exists in St. Paul, and for that reason an emergency exists." This was aggravated by the fact that hoarding the tokens in the last few weeks by car riders had brought about such a shortage that on Jan. 24 the company was moved to direct conductors to accept a 6-cent fare when out of tokens to sell.

Meanwhile, there are pending requests for increased fare in Stillwater and Bayport, Minn., filed by the Minneapolis, St. Paul & Suburban Railway, another subsidiary of the Twin City Rapid Transit Company, Minneapolis.

The application to the commission for higher fares was filed by the companies on Nov. 15, 1928. Hearing on the Minneapolis application began on Dec. 17, 1928. Both city and company filed briefs and L. R. Bitney, chief statistician for the commission, made his recommendations. W. W. Cooper, accountant, was aid in the city's representations. He had been assistant to the late Delos F. Wilcox in the valuation hearings of 1923 to 1925.

In arriving at its decision the commission found that the fair value of the company properties was $26,787,228 as of 1926 plus improvements of $950,301, bringing the total to $27,737,529 today. It reiterated its decision that the company is entitled to a 7½ per cent return on its property, as affirmed by various courts. The order cites a group of cases decided by courts in recent years holding various utilities entitled to a rate of from 7½ to 8 per cent, the latter figure predominating. It quotes Justice Pierce Butler, of the United States Supreme Court, in his opinion in the case of McCardle vs. Indianapolis Company, in which he said:

Bonds rarely constitute the source of all money required to finance public utilities. And investors insist on higher yields on stock than current rates of interest on bonds. Obviously, the cost of money to finance the whole enterprise is not measured by interest rates plus brokerage on bonds floated for only a part of the investment. The evidence is more than sufficient to sustain the rate of 7 per cent found by the commission, and recent decisions support a higher rate of return.

The order indicates that the increased fare probably will result in a reduction in passengers carried, pointing out that passengers in 1928 totaled 107,560,072 compared with 138,632,824 in 1920, and comments that the company's estimate of 105,000,000 for 1929 is "reasonable if not a maximum estimate."

An audit by the commission found that charges to property investment of about $12,000 should be made to operating expense or accrued depreciation, and that the profit of $30,500 from operation

of the Nicollet Avenue line by the Twin City Motor Bus Company, a subsidiary, should be added to the revenues of the railway in 1928 and 1929.

The dissenting opinion by Chairman O.P.B. Jacobson read in part as follows:

First of all, it is common knowledge that property values have decreased considerably since the 1925 valuation of the railway property by this commission.

In the instant case neither the city nor the company has given consideration to decreased land values. Such land value in my opinion should be considered and decreased to the present land values of other property in this locality before new rate of fare is promulgated, and I am at a loss to understand why the city did not offer any evidence at the hearing as affecting the real estate valuation in the city of Minneapolis.

Secondly, the estimate of passengers to be carried in 1929 and subsequent years is a matter entirely of conjecture.

I further believe street railway traffic in Minneapolis has reached a point where the percentage of decrease will not be so great.

In conclusion he believed that a cash fare of 10 cents and a token rate of seven for 50 cents would provide sufficient revenues for the continued efficient operation of the Minneapolis system.

Fare Increase Sought in Duluth

The Duluth Street Railway, subsidiary of the Duluth-Superior Traction Company, has filed with the Railroad & Warehouse Commission of Minnesota an application for increase in fare which will give it a fair return on its valuation. Both the fair return and the fare required to yield such return are left to the commission to determine.

Fare in Duluth is 8 cents cash or five tokens for 35 cents, the rate fixed by the commission Oct. 4, 1926, based on a "fair valuation" of $5,291,710. The company holds that its fair valuation as of Dec. 31, 1928, was at least $5,541,160, and that while 7½ per cent has been held to be a reasonable return, the rate of return on the Duluth property for the past two years has ranged from 4.5 to 3.45 per cent.

The present rate of fare, the application sets out, "is and in the future will be confiscatory."

Weekly and Sunday Passes for Buffalo & Erie

A series of weekly and Sunday passes will be put into effect on Feb. 18 by the Buffalo & Erie Railway, as announced by George MacLeod, receiver. The prices of the weekly passes will range from 75 cents within the cities of Dunkirk and Fredonia, N. Y., to $8 for the 91-mile high-speed line between Buffalo and Erie. Transferable passes along the interurban will supersede nontransferable, 45-day, 54-ride ticket books. Unlike these books, the passes will be sold on the cars as well as at ticket offices.

Fredonia and Dunkirk will also have a joint Sunday pass costing 25 cents for adults and 15 cents for children, effective Feb. 24.

$50,000,000 Program at Boston

Special commission outlines plan which would make Boston Elevated real factor in metropolitan transit at the Hub

AN ambitious project for extending the Boston Elevated Railway rapid transit lines in all directions is recommended by the Special Transit Commission. The commission has filed its report with the Massachusetts Legislature, and the public hearings on the proposed legislation will begin at the State House on Feb. 4.

Cost of construction of the proposed routes is estimated at $50,000,000. This sum does not include the cost of the necessary addition to rolling stock.

The fundamental suggestions made in the report are briefly summarized as follows:

1. The authorization of the construction of an adequate rapid transit system for the metropolitan district.

2. The purchase of the Chelsea division of the Eastern Massachusetts Railway and its lease to the Boston Elevated.

3. The creation of a metropolitan transit district which will issue its bonds in exchange for the preferred stocks of the Boston Elevated and guarantee the dividends on the common stock, which will acquire the present subways and rapid transit lines and structures now owned or leased by the Elevated company, and which will construct and own all rapid transit lines and extensions.

4. The immediate extensions of all leases of existing subways at the present rental of 4½ per cent per annum until the sinking fund accumulated from said rental is sufficient to pay the cost of said subways.

5. The division of the carrying charges of new subways and rapid transit lines and of the Chelsea division between the Elevated and general taxation with the following specific limitations, to wit, that the amount to be borne by taxation cannot exceed 50 per cent of the carrying charges of such new extensions and purchases and cannot in any event exceed an annual assessment of 35 cents per thousand upon the valuation of the transit district.

6. An extension of the period of public control for a definite period of ten years, such extension of public control to continue thereafter until (through the accumulation of the sinking fund) the Transit District has acquired a sum sufficient to purchase all of the common stock of the Elevated at par, with, however, one important proviso, to wit, that at any time after July 1, 1939, the trustees of the Transit District may call in the common stock of the Elevated at par and with the approval of the Department of Public Utilities as to price and other terms, resell the same to a responsible party who is willing to purchase the stock and operate the road without guarantees from the state or district and under the general provisions of the street railway laws of the commonwealth. This proviso means that after a period of ten years of continued public control, during which the rapid transit extensions authorized in the accompanying bill have been carried out, the road may be returned to private management.

7. A refinancing of the Elevated which will substitute low-rate transit district bonds for the present high-rate preferred stock, and will also reduce the dividend rate on the common stock from 6 per cent to 4½ per cent, thus effecting an annual saving in dividends and taxes (after allowing for a suitable sinking fund) of well over $1,000,000.

8. Numerous other provisions among which may be listed the following:

(a) Provision for the appointment of one additional trustee of the Elevated by the Mayor of Boston.

(b) Provision that the trustees cannot increase the fare above 10 cents without first submitting the matter to the Legislature for possible action by that body.

(c) The removal of the veto power of the directors of the Elevated on rapid transit extensions.

(d) The abolition of the right to tax the district for deficits.

(e) The substitution of district credit for state credit.

In the preparation of this report, the commission has consulted with the Governor of the Commonwealth, the Mayor of Boston and other public and private parties having an interest in the Elevated situation, and it has endeavored to work out a plan which is fair to the public and which it is thought is so fair to the stockholders of the Elevated company that they cannot in reason fail to accept it.

Co-ordination of the Elevated lines with the railroads running into Boston is proposed. There are now ten railroad lines entering the metropolitan district and extending in a fanlike formation to practically all sections of the metropolitan area. Some of these lines provide a substantial and satisfactory suburban service to the territory through which they pass, but upon many of them suburban service has been abandoned or curtailed because of competition with the Elevated or because of the increase in the use of the automobile.

The commission, however, suggests that the trustees of the Elevated be empowered to negotiate a contract by which the railroads will offer certain definite service for the Elevated over their tracks, for which they will be paid on a car-mile basis by the Elevated, all income from such service going to the Elevated. Exchange between Elevated lines and railroad suburban service could be effected at the Back Bay Station, the South Station, the North Station, and possibly elsewhere.

Finally, the commission recommends that the Transit District, hereafter described, acquire all of the Chelsea division of the Eastern Massachusetts Street Railway except a short mileage of that division near Malden Square, the ownership of which lies in the East Middlesex Street Railway.

If this program is carried out as outlined practically the entire metropolitan area within 5 miles of the State House will be suitably served with rapid transit facilities, and car lines or bus lines from all sections of the metropolitan district can reach various rapid transit terminals or stations, with relatively short runs, and without danger of undue delay. Furthermore the con-

struction of the two proposed rapid transit routes will obviate the congestion at Park Street and will enable passengers to reach all parts of the downtown section of Boston with a minimum of transfers.

The commission believes that the entire program should be authorized and the work carried forward as speedily as it can be done with economy and efficiency.

Senator Gaspar G. Bacon, who is president of the Massachusetts Senate this year, is chairman of the special commission. Henry I. Harriman, the new chairman of the Boston Elevated Board of Public Trustees, is a member of it. The other members are Col. Charles R. Gow, Maurice Caro, Robert J. Bottomly, George A. Gilman, Roscoe Walsworth, Newland H. Holmes and William H. Hearn.

Opposition to Eight-Hour Day in Massachusetts

The proposed Massachusetts legislation, presented by electric railway employees through William H. Keating asking for an eight-hour day working time within eleven consecutive hours, is opposed by the Boston Elevated, the Eastern Massachusetts, the Worcester Consolidated, the Springfield, the Union Street Railway, the Massachusetts Northwestern, and other railways. A hearing was held before the Committee on Street Railways and the bill was explained by Representative Keating. Labor men favored the bill.

H. Ware Barnum, counsel for the Boston Elevated, declared the bill would cost his company $2,000,000 more a year, and that it could place his company in a position necessarily to increase fares 1 cent.

Bentley Warren, for the Springfield and Worcester companies, said both his companies now have eight-hour days by agreement. He declared employees know railways cannot be served with an 11-hour limit of working schedules. The bill would give men a working club to get other things than hours and wages. It was, he asserted, no time to think of such an action. Street railways were in a condition more or less precarious. Banks, he said, could invest in bonds of paying companies but street railways were in financial difficulties and could not sell bonds to banks. The Boston Elevated, he brought out, was the only company that was in a position to do business with banks.

Prize Awarded in Philadelphia

T. Elmer Transeau, an instructor in highway engineering in Drexel Institute, is winner of the first prize in the Philadelphia Rapid Transit Company. "Help Speed Up Traffic for the 80 Per Cent" letter contest. There were 1,936 contestants.

William Van C. Brandt won second prize; H. C. Crowell, third; T. H. Henkels, fourth; and John D. Follett, fifth.

Not a Jar in a Carload

Cincinnati newspapers take up the street car and acclaim its merits in poetry, prose and pencil

FROM Cincinnati comes a story that should be reassuring to publicity men who are sometimes disappointed when material submitted to the newspapers for publication appears in form so brief or so completely changed as to be hardly recognizable. Thus with results hardly anticipated Hudson Biery, director of public relations, of the Cincinnati Street Railway, Cincinnati, Ohio, recently forwarded to one of his newspaper friends, Ike Schwartz of the *Commercial Tribune*, the following letter received from a car rider:

We all know why a chicken crosses the road—and science answers many other interesting questions, but why do your car riders sit with hands folded.

I have often noticed this peculiarity and so perhaps have you. This afternoon, for example, on an East End car enroute to town I counted nineteen out of twenty persons who ran true to form and the twentieth was an unfortunate with but one arm or, I am sure, it would have been unanimous. Why is it? You don't do it in your friend's machine or notice it on the buses or in picture shows or other gatherings. But unless occupied with a paper the car rider settles himself in his seat and nine out of ten will then peacefully cross their hands and settle down to apparent comfortable relaxation.

The last two words I believe are the answer. If you are now sitting down, experiment. Fold your hands and in an instant see if the rest of your body does not comfortably relax at the signal. What a wonderful testimonial to the natural comfort and restfulness to be found upon the cars and the actual benefit to the rider. Free from cares of driving, whether actual or of the back seat variety he gains that needed rest so beneficial in these days of hustle and bustle.

Across the corner of the letter Mr. Biery made this pencil notation, "Ike—we receive all kinds of letters, but this is a new one. I know our service is good, but I didn't know that we were putting them to sleep.—Biery."

Hands in the Street Car



Cartoonist for Cincinnati *Post* inspired by patron's letter

Next morning the *Commercial Tribune* carried the following story:

Rock a bye baby
On the street car;
You can sleep soundly
With nothing to mar
Your dream so restful,
So quiet, serene;
Not a jar in a car load
In this limousine.

"I knew our new Pullman street car construction was the best thing on wheels," declared Hudson Biery, Cincinnati Street Railway official, yesterday when commenting on the foregoing parody on the famous English lullaby, "but I did not know the service had inspired people to write verse.

"The little poem is only one of the thousands of testimonials that are literally youring into our offices in praise of the new cars. Cincinnati does not realize it, perhaps, but the cars are without parallel for smooth riding qualities. I noticed one evidence of this last week when on an East End car I counted three persons dozing in complete forgetfulness of the world. It means that conductors will have more work to do waking people who doze off to the gentle rhythm of the wheels."

R. E. Havemann's letter sent to the *Post* inspired a cartoon accompanied by the following story quoting the Havemann letter, signed by Alfred Segal:

Ah, Mr. Havemann, the hands are tired. The hands of the scrubwoman are twisted and gnarled like the branches of trees that have been in the storms and the rains many years. Nothing has ever come to her hands save work.

Once they held her children, and one child died and another went away and forgot her, and now there is nothing left in her hands but work and pain. She never can get them warm, it seems, for they are like ice from the water in which she works; and she rubs them one against the other.

The hands of the old workman have been at work since they were very young. They are nervous hands, being afraid. They cannot work so fast any more, tho they were like the lightning once. But now the foreman in the shop stands beside him impatiently, and he is quite sure the foreman is saying to himself, "What slow hands! What slow hands! This is no place for slow hands. We must get rid of slow hands."

This is why the hands of the old workman are afraid. In all their days they worked for their old age; but now they are empty, what with deaths and sicknesses that took all they saved.

The old workman's hands are folded in the car.

The hands of the middle-aged business man are round and fat. He sits puffing from the effort to catch the car. We guess they have taken in much money today, but they rest on his lap, tired, like the hands of the scrubwoman in which there are only pain and work and like the hands of the old workman which are empty after all the years.

His face is red as of one who has high blood pressure and, knowing him, we speak to him, saying: "Every one looks tired on this car."

And he replies: "It's work, work, work and what do I have at the end, but high blood pressure and diabetes?"

As for the office worker, bolder hands than his always have been taking the prizes away from him. And now, tho he is getting along in his years, his hands are doing the same work he did fifteen years ago.

His hands are full of experience, but they get only raps on the knuckles. Young hands come and take all the promotions in the office.

His hands are folded, like figures of resignation in the street car.

They are so tired, Mr. Havemann. That is why they are folded.

Single-Fare Area in Milwaukee

In response to the written request of Mayor Hoan, of Milwaukee, Wis., that the Milwaukee Electric Railway & Light Company extend its single-fare area to apply on all street car travel within the city limits, particularly the former city of North Milwaukee, recently annexed, the company has petitioned the Wisconsin Railroad Commission to fix boundaries of a single-fare area and rates which would earn a fair return on the capital invested.

The company points out that its capital employed in 1920 was $18,114,000 compared with $32,646,000 in 1928, and that its revenues have declined from year to year, until the average return for the last two years has been 4½ per cent. The rule of the State Railroad Commission calls for a return of 7½ or 8 per cent on the investment. High profits in the power division have been used to offset low returns from its transportation service, it declares.

In the event that the commission will prescribe a single-fare area and rates to yield an increased return on its transportation system, the company offers to reduce the rates of its electric utility by an amount not less than the estimated increase in revenue from the street cars. Hearings on the company's application will open shortly.

Kansas City Company Goes to Commission

The Kansas City Public Service Company, Kansas City, Mo., at a directors meeting on Jan. 25, decided to take the petition for an increased fare to the State Public Service Commission. The negotiations with the city had become so involved that the board of directors decided an appeal to the state body was the most desirable course. The statement said in part:

The board of directors, at its regular monthly meeting, directed that the entire situation relative to the method of accounting, valuation, rate structure and return of the company be placed before the Public Service Commission for investigation and determination.

This action has been rendered imperative by the fact the application of the proceeds derived from the sale of the power plant has been seriously questioned, the accuracy of the accounting methods of the company disputed, the assertion made that the franchise contemplated a fixed initial valuation of the property and the company's computations as to the income allowable on that property challenged.

The company believes the power plant proceeds have been applied in full accordance with the letter and spirit of the franchise and proper accounting practice, that no value was placed or attempted to be placed on the property in the franchise, and that it is entitled to the full permissible return stated by it in its reports to the council and industrial committee.

Under the law, the Public Service Commission is the final arbiter of the affairs of the company. The books, records and methods of accounting of the company must conform to its regulations. It is the only body which has power to make a final and authoritative ruling upon the points at issue, and steps are being taken promptly to bring the entire matter before the commission to the end that a complete investigation will be had and the questions of accounting, valuation, rate structure and return finally settled on a basis fair and just to all concerned.

Report on Los Angeles

Recommendations made by committee of local city club expected to promote interest in railway problem

AS A RESULT of meetings and conferences, the traffic and transportation section of the Los Angeles City Club is impressed with the need for the observance of certain fundamentals in connection with the traffic problem relating to the Los Angeles situation. As outlined to the club on Jan. 15, the conclusions and recommendations follow in part:

1. That the most valuable land in the central business district is the public street. The street area is limited, its use should be developed to the highest state of efficiency; special privileges interfering with the rights of the masses detract from other property values. The greatest good for the greatest number should be the rule.

2. That local, suburban and interurban systems of transportation have been handicapped by their insufficient earnings to provide adequate and attractive service to those who should use their lines. Their patronage is not increasing in proportion to the increase in our population.

3. That our citizens are spending ten times as much per capita for the use of the private automobile as they are for local street car transit, thus indicating an obvious opportunity for the street car and bus to cater to the increasing demand for better transportation by improving their service.

4. That transportation by rail must be retained for mass transportation; that the bus does not appear to be a substitute for street cars, but is rather an auxiliary vehicle to be used as a feeder to the rail systems and also to supplement the street cars when the tracks become saturated with electric cars.

5. There must be a co-ordination of the systems and improvement of existing facilities in order to obtain their maximum (use) service, as a first step rather than an additional rapid transit system of great cost. It may be wise and proper to inquire seriously as to whether or not Los Angeles is justified in initiating a program of expenditures in subways and elevated structures. It is upon the latter two phases of the problem that the section is now engaging its attention.

A—*Co-ordination* of all rapid transit systems, local street cars and buses is imperative for the best and most efficient service.

B—*Downtown Streets*—"Increase the Efficiency of the Streets."

1. Pedestrians should be favored. Sidewalks should be free of obstructions.

2. Window shopping and ticket distribution should be on private property. All merchandising where customer stands on sidewalk should be prohibited.

3. Delivery of goods across sidewalks should be prohibited during rush hours.

4. Storage garages accessible to business district should be encouraged.

5. Traffic signals should be "progressively" timed.

6. Parking should be prohibited on streets of insufficient width to permit free passage of an automobile or truck between a moving street car and a parked car. Tending toward ultimately no parking in the central business area we recommend it be prohibited on either Broadway or Hill Street as an educational movement.

7. Buses should operate on "through routes" in central business districts.

8. Sidewalk doors, manhole covers and street trenches should not be open during rush hours.

C—*Local Street Cars*—"More Cars and Better Service."

1. Local street car fare should be sufficient to encourage improved service and extensions.

2. Within approximately 6-mile radius area we should have one district, one fare and universal transfers between the red and yellow cars.

3. Vehicles should observe a "slow" sign on approaching street car intersections.

4. Where practicable, outside of central business district, the street car tracks should be curbed in between cross streets.

5. Skip stops should be encouraged to speed up main lines.

D—*Rapid Transit*—Both to "decentralize" and to "centralize."

1. Interurban lines should not make local stops outside business centers.

2. Interurban lines should be off grade in congested districts.

3. Interurban lines should have elongated terminals (not stub end) through the central business district.

4. A modern elevated railroad structure will give the same service as a subway at much less cost and "elevateds" are practical in many locations.

5. Interurban lines between subcenters should run on private right-of-way or on curbed in right-of-way with parallel roadway and no grade crossings.

E—*Buses.*

Bus transportation at present is in three classes, the feeder bus with transfer privileges to other lines of transportation.

The auxiliary or local bus which may parallel certain street car lines to cut down the number of stops on that line with transfer privileges if advantageous.

The de luxe bus for special suburban service.

The feeder rus and auxiliary buses should be a co-ordinate part of the rail transportation system and financed in conjunction therewith.

Another Extension in New York

The Board of Estimate of New York City on Jan. 31 denied the application of the Equitable Coach Company for another 180-day extension of its triborough bus franchise rights. The board cut to 60 days the time within which the company must obtain the Transit Commission's approval of the issue of securities to finance operation. It was on Mayor Walker's motion that the 60-day reprieve was granted.

On Feb. 4 the committee of the whole will resume its open hearing on the Equitable's amended petition for Brooklyn and Queens where its routes are to be merged with B.-M.T. surface lines under an agreement with the railway.

Mechanics' Association Formed in Charleston

A mechanics' association, to be sponsored by the Charleston Interurban Railroad, Charleston, W. Va., has been formed by the company's shop men to create greater interest among them in their respective lines of work and to encourage efficiency.

Certificates of proficiency will be issued to members on various subjects in which they have qualified. After the certificates are issued to a member, or after he has procured three such certificates, he is then promoted to a higher grade in the association. There are to be three grades; namely junior, senior and associate. Suggestions submitted by members are to be investigated by an appointed committee and reports of such investigations are to be turned over to the management of the company.

In the January number of the "Interurban Messenger," the official publication of the company, F. B. Carpenter, superintendent of equipment, urges the employees to compete for the prizes in the Maintenance Contest promoted by the ELECTRIC RAILWAY JOURNAL.

Conventions of Indiana Associations

Annual joint conventions of the Indiana Public Utilities Association, the Indiana Gas Association and the Indiana Electric Light Association will be held in the Hotel Gary, Gary, Ind., on May 1, 2 and 3.

Committees on programs for these conventions have been appointed and special committees for other features of the annual meetings are to be appointed at once. Plans are under way to make this year's convention more valuable to the public utility industry as a whole than every before.

Canadians Plan 25th Anniversary Meeting

Montreal has been selected as the place of the 25th annual meeting of the Canadian Electric Railway Association. It will be held on June 5-7. As in previous years there will be an exhibit in connection with the convention and the officers are looking forward to the largest attendance in the history of the association.

The Canadian Electric Railway Association was formed in Montreal 25 years ago and the executive committee felt that it was fitting that the meeting should be held in that city to commemorate the quarter century anniversary.

Fares Reduced on Oregon Line

A reduction of fares to Vancouver, Wash., on the system operated by the Portland Electric Power Company has been announced by President Griffith. This applies to purchasers of books of ten tickets which will now be sold for $1.50, a reduction of 2 cents a trip. The regular fare will remain at 17 cents. The reduction was justified by the removal of toll on the interstate bridge between Oregon and Washington, which became effective on Jan. 1. Under the old toll conditions on the bridge the company lost a half cent on every passenger, according to Mr. Griffith. One and a half cents of the 3½-cent toll reduction is now retained by the company and the other 2 cents are given to the passengers. A toll of 25 cents for each street car that crosses the bridge is still charged.

Money Prize for Name in Denver

The Denver Tramway, Denver, Col., issued on Jan. 20 a four leaf "newspaper," 4x7 in., easy to read, the front page carrying the caption: "What's in a name?" A statement promised publication now and then by the company. It was added that there was so much in a name that $25 would be paid to any one, not an employee, who suggested a name which would be selected by the judges appointed. Feb. 9 is the last day suggestions will be received.

The little newslet will be placed in boxes on every car, the box carrying the invitation: "Take One." How schedules are arranged, changed, peak of load, slump, important events coming to Denver, and a few jokes will comprise the make-up. The pamphlet will keep patrons posted and will answer that often uttered query: "I wonder why the Tramway does not do so and so?"

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***June 27-28*—Central Electric Railway Association, Michigan City, Ind.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Safe Operation by Asheville Men Cited

The Asheville, N. C., railway department, of the Carolina Power & Light Company, won first place in the accident prevention contest conducted by the company in all departments of the two Carolinas during 1928. It set a perfect record of no time lost during the entire year, by reason of accidental injury of employees. Announcement of this record was made to members of the union at their annual banquet meeting by Ed White, superintendent of transportation. A banner has been ordered for the Asheville street railway men.

There were 106 employees included in the Asheville street railway department. Regular accident prevention meetings are held in each department. Every form of safety is discussed and action planned including condition of tracks and equipment, traffic conditions, and efficiency of the men themselves. The Asheville street railwaymen have adopted a motto for another perfect record during 1929.

Ohio Employee as Good-Will Messenger to Canal Zone

In the interests of good-will, Mrs. Mabel Miller, cashier of the freight department of the Indiana, Columbus & Eastern Traction Company, at Lima, Ohio, is en route to Cuba, Jamaica, Haiti, Nassau and the Canal Zone, bearing greetings from the State of Ohio in commemoration of its 125th anniversary.

Her trip is the result of an opportunity presented to the women of Ohio and sponsored by the Ohio Chamber of Commerce during the fall of 1928. Prior to the Ohio Progress Exposition at Columbus Oct. 25-Nov. 3, invitations were delivered to members of the Ohio Chamber of Commerce, members of all Chambers of Commerce in Ohio, industrial plants, business firms and civic organizations asking nominations to be made from among the thousands of young women in Ohio who would be eligible to engage in competition for the honor of being named the best promoters of this enterprise. Mrs. Mabel Miller was entered in the competition with other Ohio women and she proved to be a capable organizer and promoter in the campaign, enlisting the support of state and municipal officials and hundreds of other men and women of Ohio. As a result of her worthy efforts she was presented with a travel-award to the West Indies.

An interesting pamphlet has been printed, addressed to the citizens and residents of the West Indies and containing messages from the Governor of the State of Ohio, secretary Ohio Chamber of Commerce and J. M. Pogue, general manager of the Indiana, Columbus & Eastern Traction Company, with a full spread of statistics of the Buckeye State. These booklets will be presented by Mrs. Miller to persons she meets on her travels.

Recent Bus Developments

Taxi Privilege in Seattle

An ordinance granting to Sam W. Taggart of the Red Top Cab Company an exclusive 25-year franchise for operation of taxicabs, for-hire cars and sight-seeing cars within the corporate limits of Seattle, Wash., has been introduced in the City Council. In return for this concession, Mr. Taggart is to pay the city annually 2 per cent of the gross earnings of the system; to keep his equipment in good repair; and to set aside a monthly depreciation reserve fund of not less than 1 cent for each mile traveled by his cabs and for-hire cars.

At the expiration of the franchise, the grantee is required to turn over his equipment to the city free, a contingency of special interest since the city is now operating its own railway, but the city may, if it elects, grant an additional fifteen years' franchise, provided the grantee pays the city in cash an amount equal to reproduction cost of the equipment, less accrued depreciation.

Maximum and minimum rates to be charged would be fixed by the Council. For the first five years these rates would be under the ordinance: For one-passenger cabs, maximum 35 cents for the first quarter-mile, and 10 cents for each additional quarter-mile; minimum, 25 cents for the first half-mile and 5 cents for each additional quarter-mile. For each additional passenger, entire trip, maximum 20 cents, minimum 10 cents. For for-hire cars, the rates prescribed are: 4-passenger cars, $2 for the first half-hour; $3.50 for the first hour, and $3 for each additional hour. For six-passenger cars, $2.50 for the first half-hour; $5 for the first hour, and $4 for each additional hour. For sight-seeing cars, a maximum of $3 for one continuous trip is fixed.

Payment of Ton-mile Tax in Iowa Compulsory

Iowa bus operators lost their last chance to protest payment of the state ton-mile tax on motor vehicle common carriers when the Iowa Supreme Court on Jan. 23 refused to grant a rehearing on its recent decision which upheld the validity of the Iowa motor carrier law under which the tax was assessed. As a result, four of the leading bus companies in the state will be required to pay more than $65,000 in delinquent taxes and penalties.

The high court in its refusal to grant a rehearing took the same position it took several weeks ago when it upheld a decision by Judge W. G. Bonner in the Polk County District Court. He ruled that the ton-mile tax on motor common carriers, operating over regular routes between fixed terminals, does not discriminate against this class of traffic as contrasted with oil trucks, moving vans and farm trucks operated over the highways by private interests. The Supreme Court reiterated the opinion that the statute questioned by the Iowa Motor Vehicle Association was not discriminatory and upheld the constitutionality of the law.

Virginia Commission's Authority Upheld

Finality of the decisions of the State Corporation Commission of Virginia in regard to issuing permits for bus lines has been emphasized by the Supreme Court of Appeals in affirming the case of Petersburg, Hopewell & City Point Railway vs. Commonwealth, ex rel., State Corporation Commission.

In this case the railway, connecting Hopewell and City Point with Petersburg, objected to the commission's action in granting a certificate permitting a bus line to parallel its tracks. It insisted that it rendered all transportation service needed in its territory and that the operation of the bus line would decrease its revenues.

The Supreme Court held that such matters were left to the determination of the Corporation Commission, which is vested with the control of transportation within the State.

Substitutions in Nebraska Prohibited

The Nebraska Railway Commission has rejected the application of the Lincoln Traction Company for authority to substitute bus service on the line leading to the suburb of Normal, made after the City Council, in the course of street improvement work, had ordered the company to expend a considerable sum in paving and bridge work. The commission held it was bound to protect the owners of property in the section that abandonment of the car line would leave without any convenient service by the unwritten but tangible agreement made by the former owners of the company with the people who established their homes in the district; that the city, so long as it requires the railway to pay an occupation tax for the use of its streets, should furnish streets and bridges of a type that may be readily used without forcing the company to construct a part of these, but it has no way of enforcing that finding on the city fathers, who insist on pushing through the improvements.

When the company rerouted its College View line some of these people were compelled to accept Normal service instead, and now it was proposed to take this from them. The railway suggested that bus service be substituted, but this would have to be confined to paved streets, which would mean abandonment of part of the Normal served territory.

Park Tax for Baltimore Buses?

Suggestion that all fees paid to the state by passenger buses operating in the city of Baltimore be turned over to the Board of Park Commissioners for use for public park purposes has been made by William I. Norris, retiring president of the Board of Park Commissioners. The parks now receive 9 per cent of the gross receipts taken in on most of the railway lines, but nothing from the bus lines. It was pointed out by Mr. Norris that this change would divert fees from the State Treasury to the Park Board and there would be no additional burden on those operating the buses or the public. It is planned to ask the General Assembly, now in session at Annapolis, to pass a bill providing for the change.

Upshot of Menasha Controversy

As an aftermath to a dispute over license fees at Menasha, Wis., the Wisconsin-Michigan Power Company has announced discontinuance of all buses from Appleton to Neenah and Menasha on March 15. The company removed all extra rush-hour buses and two regular buses in Menasha recently, when the City Council raised the fee from $50 to $300 for each bus and required licenses. The city retaliated by renting trucks for the emergency.

The company's decision will leave Appleton, Neenah, Menasha, Kaukauna, Combined Locks, Kimberly and Little Chute without any public means of transportation other than steam railroads. Wording of the company's notice, which says that "under present conditions it must retire from the field," indicates that there is a possibility that the service might be continued if the municipalities served act promptly to establish a uniform bus license fee. Plans are being made for a conference to be held some time in February in an attempt to settle the differences.

Service to New Portland Hospital

With the completion of the new veterans' hospital in Portland, Ore., the Portland Electric Power Company has extended its bus schedule to conform to night visiting hours. The twenty-minute day schedule is changed to a 30-minute night schedule. When the hospital service was first opened only one day bus was used. Another was soon added and now the night service is a further expansion.

Added Services for Los Angeles

A certificate of public convenience and necessity has been granted by the California Railroad Commission to the Los Angeles Railway to operate motor coach service between Los Angeles and Inglewood.

Financial *and* Corporate

Sale of Michigan Properties on March 14

Sale of all properties of the Michigan Electric Railway was ordered on Jan. 19 by Judge Charles C. Simons in the Federal Court to satisfy a mortgage on the property securing an issue of bonds, the holders of which are represented by the Bankers Trust Company, New York City, acting as trustee. The date has been fixed as March 14 and the place Jackson.

The mortgage and interest on the properties amounts to $8,699,706. The mortgage was given Jan. 1, 1923, as security for a bond issue of $7,000,000.

Last June the trust company filed suit in the Federal Court, asking foreclosure of the mortgage on the grounds the interest on the mortgage had not been paid. Judge Simons at that time appointed John F. Collins, of Jackson, receiver for the company.

The company operates the street railway systems in Jackson, Battle Creek, Kalamazoo and Lansing and interurban lines between the cities. It also holds the capital stock in the South Michigan Transportation Company, which operates buses connecting these places.

$25,000 Improvement in Denver Net

The Denver Tramway, operating in Denver, Col., in 1928 increased its net income over 1927, through a reduction in operating expenses, in the face of a decrease in total operating revenues. Total operating revenues for 1928 were $4,310,040 compared with $4,390,016 in 1927. Operating expenses and taxes were decreased more sharply than operating revenue with the result that net operating income increased from $926,471 in 1927 to $951,040 in 1928. After inclusion of miscellaneous income and deductions for bond interest and amortization of discount on funded debt, the balance available for dividends on preferred stock and other corporate purposes in 1928 was $460,960.

This is equivalent to $4.41 a share on the preferred stock on which dividends are cumulative up to 5 per cent. On account of a technical accounting change in the form of this year's statement the figure of $4.41 per share is not directly comparable with the per share estimate based on the report issued at the end of 1927. Computed on a similar accounting basis, the balance available for preferred dividends in 1927 was equal to approximately $4.07 a share.

A statement, commenting on the trend of earnings, was issued by the directors. It follows in part:

Passenger revenue decreased $90,751 in comparison with 1927 due to the transportation of 1,189,971 fewer revenue passengers. This was offset by a slight increase in other operating revenues with the result that for the year total operating revenue decreased $79,975.

The tendency is still downward and it will be impossible to meet it with further reduction in operating expense. The company is obliged to meet approximately $225,000 per annum in bond sinking funds. The balance, therefore, of $460,960 this year was not sufficient to meet sinking funds and pay the 5 per cent cumulative dividend on the preferred stock. Dividends on the preferred stock were paid at the rate of 3 per cent per annum and are now in arrears to the extent of $2.50 per share.

Merger Prospects Slim

Unlikely that Congressional approval will be obtained at this session for consolidation in Washington

PROSPECTS of obtaining Congressional approval this session of the resolution authorizing a merger of Washington's transportation systems are believed to be practically negligible as the result of the inability of the Senate District Committee to reach an agreement to bring the resolution up on the floor. The most insurmountable difficulty encountered by the committee in trying to report out the measure has arisen over the method of valuation.

There is entire agreement that the unification compact to be approved by Congress shall be shorn of the proposed $50,000,000 valuation clause or any other fixed amount. There is also full accord among the Senators of the committee that a complete revaluation of the properties shall be left to the Utilities Commission. There is a strong movement of the progressive element in the Senate, however, to make it incumbent upon the commission to employ the prudent investment method in evaluating the new company. By the injection of this issue, it is believed in some quarters that sight will be lost of the immediate merger over an attempt by an element in the Senate to obtain a precedent for its theory.

Except for the matter of obtaining a valuation, the committee has agreed on a tentative merger resolution. Among other restrictions inserted in this resolution is one designed to extend to the authority of the Utility Commission to regulate and pass upon service charges and fees that may be imposed by the holding company. It was decided to allow the commission to determine when the public interest could be served by permitting a competitive transportation system to start operation, rather than to assure the new company of a monopoly of the transportation facilities. It was also agreed to require the rates of fare to remain unchanged for a period of two years after the completion of the merger. The companies are allowed a period of two years to accept the compact after it is passed by Congress.

Balance in Reading $73,589

The accompanying table shows the earning statement of the Reading Transit Company, Reading, Pa., and subsidiary companies for the year 1928 compared with 1927.

STATEMENT OF BALANCE OF NET INCOME OF READING TRANSIT COMPANY FOR YEARS ENDED DEC. 31

	1928	1927
Operating revenue	$2,793,328	$2,872,775
Operating expenses and taxes	$1,576,708	$1,621,327
Maintenance and depreciation	630,337	643,813
Rentals	314,529	317,125
Total operating expenses, maintenance, depreciation, taxes and rentals	$2,521,574	$2,582,266
Operating income	$271,753	$290,508
Other income	16,829	20,140
Total income	$288,583	$310,648
Deductions from income:		
Interest on funded debt	$87,834	$87,955
Other deductions from income	8,014	20,115
Total deductions from income	$95,848	$108,071
Net income	$192,734	$202,577
Provision for dividend on preferred stock	119,145	119,145
Blance of net income	$73,589	$83,432

Valley Division of Illinois Traction Acquired

The Illinois Commerce Commission has entered an order authorizing the Chicago & Illinois Valley Railroad to acquire and receive all property rights and franchises constituting the Illinois Valley division of the Illinois Traction, Inc. Authorization is also given to issue $1,000,000 of its common stock to consist of 10,000 shares without par value.

Six-Mile Line to Be Abandoned

Petition by the Cortland County Traction Company for approval of the abandonment of its line from Hooker's crossing in Homer to Preble, N. Y., a distance of 6¼ miles, was granted by the Public Service Commission on Jan. 21. Actual abandonment is not to become effective until April 1.

Evidence submitted to the commission showed that in 1927 the expenses of operating the Homer-Preble line was $10,000, while the gross revenue was $4,829. The gross operating revenue for the entire system for that year was $63,957, with a net loss of $18,118. It was further shown that if the line was to be continued in operation, improvements estimated to cost more than $40,000 would be necessary, and that the company has met with a steadily decreasing revenue and increasing operating loss.

The Delaware, Lackawanna & Western Railroad gives daily service between Preble and Homer. Commissioner Brewster, who heard the company's application, said the evidence showed that there was very little demand for the line except by school children under a

contract between the railroad and the school districts by which $800 a year is paid for carrying the children.

September to See End of Muskegon's Cars

Frankly and forcefully D. A. Powell, vice-president and general manager Muskegon Traction & Lighting Company, summed up the transportation situation in Muskegon, Mich., on Jan. 25 before the Mayor and City Commission. He pledged co-operation in the working out of the problem, but declared that cars could not run after September. If the city did not feel that bus transportation would solve the problem and that it would be a bad thing for the city to eliminate the railway, then the company would sell the system or an equity in it at a rock bottom price. Meanwhile he promised continuation of the system until an arrangement could be effected.

The Mayor discussed with Mr. Powell the possibility of the zone system as an ameliorator, but the general manager discounted the efficacy of that plan. As Mr. Powell saw it, it had become a community problem calling for a levy on all the people to provide a transportation system. The fault was not to be ascribed so much to bus competition as to the increasing number of private automobiles. His company was faced with the necessity of spending from $150,000 to $175,000 in new equipment and repairs within the next few years and this, he claimed, was impossible financially. When asked if he thought buses would make money, he replied in the affirmative if they did not have to provide facilities for handling the traffic at the peak hours. A system of this kind, like any other, would serve no good purpose at this time and he and the other officials felt that they did not care to invest any more money in either system.

Mayor Dratz closed the discussion with the promise that the commission would give the question serious study and would from time to time call on Mr. Powell for testimony. He in turn offered to turn over the books of the company for the city's study.

The precarious future of the transportation system in Muskegon recalls an advertising campaign instituted by the company three years ago to answer the question of the hour "Is electric railway transportation a necessity in a community the size of Muskegon with a population of 50,000?" Since that time the population has increased until it is now approximately 58,000. Railway traffic has gradually decreased during the past three years and it is now up to the commission to decide whether transportation is to be supplied entirely by buses or whether a combined bus and street railway operation can be worked out. In the latter case it will be necessary for the city or some other party to effect such a combination.

The Muskegon Traction & Lighting Company also supplies Muskegon and Muskegon Heights with gas.

Transportation Earnings Lower in Tampa

In a letter to the stockholders of the Tampa Electric Company, Tampa, Fla., President Knight states that transportation earnings which constitute 18 per cent of the consolidated revenue were 15 per cent less than in 1927 but 6.4 per cent greater than in 1924, which was the last year prior to the boom period. Combined earnings of all departments show a decrease of $56,682. Operating expenses exclusive of retirement accruals show a net reduction of $72,596. The economies in operation offset not only the loss in revenue, but also a substantial amount of the increase of $42,367 in retirement accruals.

More Juggling in Seattle

City diverts $800,000 from water fund to meet payment on principal of purchase price of Municipal railway

PAYMENT of an installment of $1,062,225, due from the city to the Puget Sound Power & Light Company on the Municipal Street Railway purchase price March 1, has been provided for by passage of an emergency ordinance in the City Council of Seattle, Wash. The ordinance authorizes a loan of $800,000 to the street railway fund from the water fund. Fundamentally, $484,000 of the money is to come from the Seattle municipal improvement bond 1927 construction fund, backed by general obligation bonds. An even $300,000 comes originally from the municipal water extension bond 1927 construction fund, backed by the utility bonds of the water department. The rest will be made up in current revenues from the water department.

Action to this effect was taken in accordance with an agreement reached between the City Council and Mayor Frank Edwards. It kills the campaign instituted before the King County delegation in the State Legislature to pass a bill authorizing a general tax of 2.5 mills in Seattle to help finance operation and maintenance of the Street Railway Department. This bill was presented to the King County Senators by Seattle's Superintendent of Public Utilities, George B. Avery, as an emergency bill which he desired to have enacted before Feb. 1. The measure authorized the City Council, by a three-fourths vote and approval by the Mayor, to levy 2½ mills in 1930 and succeeding years, to make up any deficiency in operating expenses.

In presenting his bill to the King County Senators, Mr. Avery declared that he would be able to save, month by month during the coming year, sufficient money to meet the principal payment due Feb. 1, 1930, and that in his opinion it would never be necessary to levy the 2½ mills. But the bondholders, he added, insisted on the guaranty of the levy as the condition of waiving the principal payment due on Feb. 1, this year. Mr. Avery quoted James B. Howe, attorney for the Puget Sound Power & Light Company, as saying that if the bill is not passed, the Stone & Webster interests would take judgment against the city, and the general fund would be obligated for the entire $9,000,000 still due on the original $15,000,000 purchase price.

Some members of the Council looked upon the bill proposed by Mr. Avery as a way out of the temporary financial difficulty, but others opposed it vigorously as an opening of the general tax fund to all utilities. It was pointed out by certain Councilmen that the measure would immediately bring to the Puget Sound Power & Light Company virtually all the advantages of having its bonds made general obligations upon the city. With the arrangement completed for the loan from the water department, Mr. Avery announces that he will suspend his campaign in the State Legislature.

In the meantime, a project which would completely change the administration of the railway system has been presented in a session behind closed doors, between members of the Seattle Traffic Research Commission and the City Council, together with Mayor Frank Edwards. The plan provides that charge of the railway system be vested in a non-salaried board of seven citizens. A majority of the Council, however, expressed opposition to the creation of the proposed commission by act of the State Legislature, but they were open-minded on the proposal, as an alternative step, that the plan be submitted to a vote of the people as a charter amendment.

The first organized campaign of protest against the proposed rapid transit plan, on which a board of citizens have worked for two years, and which has met with widespread interest and approval throughout the city, has been launched by the Seattle Real Estate Board, a special committee of which appointed to study the plan advises that the cost of the project would be too great for the city to bear at the present time, particularly as it would throw an additional burden on real estate taxation that could not be met. The Real Estate Board urged exhaustive study of the report and investigation of the city real estate conditions before any action is taken toward instituting a project of this kind.

Seven Per Cent Earned on Dallas Property

During the year 1928 the Dallas Railway & Terminal Company, Dallas, Tex., earned enough money to pay a total of $762,665, or 7 per cent, on its property value. In addition, $107,242 was placed in the repair, maintenance and depreciation reserve and $61,383 in surplus reserves. Gross earnings for the year were $3,260,567, a sum $438 less than in 1927. Total operating expenses were $2,329,275. Property value of the company at the end of the year totaled $10,895,221. During the year 47,226,823 passengers were carried.

Legal Notes

CALIFORNIA—*Street Railway Denied Increased Fare by Railroad Commission May Secure Release From Any Court Having Jurisdiction, Notwithstanding Public Utilities Statute.*

This is the case in which the District Court of California ruled on Sept. 10, 1928, on the plea of the Los Angeles Railway from the order of the Railroad Commission denying the railway an increase over the 5-cent fare. The court held such fare confiscatory where the return on the railway rate base was approximately 4.9 per cent. The property of railroads is under the fundamental guarantees of the constitution, and railroads cannot be deprived of their property without just compensation or due process or be denied equal protection of the law. If the power of regulation of the State Commission over carriers is so unreasonably exercised as to prevent the carrier from obtaining a fair return on the property invested, the commission's exercise of power is violative of the due process clause of the constitution. Where the Railroad Commission made an order denying the street railway the right to increase its fares, the company could resort to any court having jurisdiction to afford relief. The comment of the District Court was to the effect that the Railroad Commission's order denying permission to the railway to increase the existing rate of fare constituted exercise of jurisdiction by the commission, giving the Federal Court power to enjoin enforcement of the order if confiscation of the utilities property resulted, even if the rate provisions contained in the franchises from the city constituted contracts. [Los Angeles Railway vs. Railroad Commission, 29 (2nd), Fed. Rep., 140.]

CIRCUIT COURT OF APPEALS—*License for Interstate Carriers Upheld.*

An ordinance of the city of Philadelphia, regulating all buses on city highways including interstate buses, and enacting an annual license fee of $50 per bus, was held not an unreasonable burden on interstate commerce, as to the amount of license fees, requirements for city license tax, designation of drivers and routes and detailed information required. [American Motor Coach System vs. City of Philadelphia, 28 F, (2d), 736.]

FEDERAL SUPREME COURT — *Company Not Liable Under Federal Employers Liability Act When Employee Is Injured Through Disobeying Orders.*

A railroad conductor had printed orders that his train was to pass another coming in the opposite direction at a certain siding. He did not find the train there, so ordered his own train to proceed to the next siding and was killed in the resulting collision. A telephone message had been sent to him through the station agent not to proceed, but through negligence of fellow employees he did not receive the message. It was held that the company was not responsible under the Federal Employers Liability Act. [Unadilla Valley Ry. vs. Caldine, 49 Sp. Ct. 91.]

FLORIDA—*Terminal Company Granting Special Privilege to Conduct Telegraph Business Need Not Grant Like Facilities to Another Company.*

So long as the service furnished by a common carrier in the discharge of its public duties is adequate to the public needs, the public is not concerned with the selection of the particular agency through which such service is supplied. Hence, a terminal company which granted exclusive privileges to a telegraph company to conduct business upon its premises does not create a monopoly in the odious sense of the word, nor is the terminal company obliged to grant similar privileges to another telegraph company. [State vs. Wells et al. 118S, 731.]

INDIANA — *Legislature May Withhold Power to Regulate from Public Service Commission.*

The Legislature of 1925 withheld from the Public Service Commission the power to regulate buses operating as common carriers within certain cities where the local authorities had previously granted licenses to buses. It was held that this was within the power of the Legislature, regardless of the motive of the legislators, and that Muncie was such a town. [Denny et al. vs. Brady, 163 N.E., 489.]

KANSAS—*Negligence in Driving Team Attached to Grain Binder Over Railroad Crossing in Front of Approaching Train Barred Recovery for Resulting Injury.*

Ordinary care for his own protection was not used where the plaintiff driving a horse team attached to a grain binder approached a railroad crossing with which he was familiar, where his view was obstructed by a station house, so that he could not see a train coming from that direction until the team was entering upon the track. The driver slowed the team down, but stated that he looked and listened for a train, but did not stop his team or go forward to a point where a view of the track could be had and where he could have ascertained that a train was approaching if he had done so. He drove the team and vehicle upon the track when a train traveling at a rate of 20 m.p.h. was only 300 ft. away, and sustained an injury in the collision that followed. It was held that his negligence barred an action for injury. [Clark vs. Atchison Topeka & Santa Fe Railway, 272 Pacific Reporter, 128.]

KENTUCKY — *Franchises of Louisville Railway for operation are valid.*

The Louisville Railway operates in the city of Louisville under two city ordinances, which provided for the adjustment of the former franchises of the company. One was enacted in 1922 and the other in 1926. Recently these ordinances were attacked by a group of tax payers who filed a petition in equity attacking the validity of the ordinances, and asking that an injunction be issued against the railway company to prevent it from operating under them. The various points in this petition were considered by the Court of Appeals of the State, which declared the ordinances valid and dismissed the petition. [Poggel et al. vs. Louisville Ry. 10 S.W., (2d), 305.]

NEW HAMPSHIRE—*Automobile Driver Cannot Recover While Operating Without License.*

The act of an automobile driver in operating a car without a license as required by the law was held causal, so as to preclude recovery for injury received in collision with a train. [Johnson vs. B. & M. R.R. 143 A, 516.]

NEW JERSEY—*Deduction From Franchise Tax of Street Railway's Payment to Township for Removing Snow From Streets Not Permitted.*

A state law permits a railway company which pays taxes to any taxing district for exclusive use, pursuant to agreement or ordinance (except cost of paving and taxes on real and personal property), to deduct such taxes from its franchise tax assessed under the franchise tax act. A railway had an agreement with a township to pay half of the cost of removing snow from certain streets in lieu of the company's obligation under its franchise to remove all of the snow from its tracks. It brought suit to have this payment declared part of its franchise tax under the franchise act. The court declared, however, that where a company receives an equivalent in value for a payment made, no deduction is permitted. Another example, besides the case in court, would be the purchase of water from a municipality. [Public Service Co-ordinated Transport vs. Clark 143A, 722.]

OHIO — *Guest or Passenger in Auto Obligated to Warn Driver of Danger Which Apparently Cannot Be Seen by Driver.*

The charge of contributory negligence in an action for injuries is justified where the evidence showed that the guest in an automobile assumed responsibility of ascertaining whether it was safe to cross street railway tracks in front of an approaching street car in turning from one side of street to the other between intersections to proceed in the opposite direction. [Smith vs. Cleveland Railway, 164 N.W., Rep. 59.]

Personal Items

A. Taurman Honored Again

A. Taurman, superintendent of equipment, way and structures Birmingham Electric Company, Birmingham, Ala., has been elected president of the Electric Railway Association of Equipment Men, Southern Properties. Mr. Taurman is known to JOURNAL readers for his frequent contributions to its pages and particularly for his article on the application of Alemite lubricating fittings to Brill half-ball brake hangers, which won the equipment essay award for May, 1928, in this paper's Maintenance Contest.

His experience began in the mechanical department of the Southern Railway at the Richmond shop in 1901 where he served as machinist apprentice, shop foreman and mechanical draftsman. Later he was connected with the American Locomotive Company and in 1907 accepted the position of mechanical draftsman with the New York Air Brake Company at Watertown, N. Y. As told previously in these pages, Mr. Taurman served the Virginia Railway & Power Company and in October, 1919, became superintendent of equipment for the Birmingham Railway & Light Company, the predecessor of the Birmingham Electric Company. He has given considerable attention to mechanical improvements in rolling stock and track construction.

Messrs. Wheat and Vaughan Leave California Commission

Resignations of Carl I. Wheat, chief counsel for the last six years of the California Railroad Commission, and Reginald L. Vaughan, for the past five years examiner and assistant attorney, were accepted with regret by the commission on Jan. 21. The resignation of Mr. Wheat is effective Feb. 15 and that of Mr. Vaughan on March 1, 1929.

Mr. Wheat resigns from the commission to re-enter the private practice of law in association with the firm of McCutchen, Olney, Mannon and Greene of San Francisco. During his six years association with the commission he represented that body in more than 90 cases before the California Supreme Court, a number before the United States Supreme Court, and several before other federal courts. He also represented the commission in a number of important proceedings before the Interstate Commerce Commission. In association with Assistant Attorneys Vaughan and Roderick Cassidy, he directed publication of "Public Utility Regulation in California" and the "Digest of Decisions of the California Railroad Commission," two important volumes on public utility regulation. He was graduated from Pomona College in 1915, and from the Harvard Law School in 1919.

Mr. Vaughan resigns from the commission's legal staff to engage in the practice of law on his own account, devoting a considerable portion of his time to the affairs of the Wesix Heater Company, of which he will act as chief counsel. Mr. Vaughan received his A.B. degree from the University of California in 1922, and his J. D. degree from that institution in 1924.

D. C. Green in New York

Official of Salt Lake City Company to join Electric Bond & Share staff. Successful in public relations

D. C. GREEN, vice-president and general manager of the Utah Power & Light Company, Salt Lake City, Utah, is to leave early in March to become an executive with the Electric Bond & Share Company, New York, N. Y.



D. C. Green

Mr. Green is one of those of whom the poet wrote "For they, while their companions slept, were toiling upward in the night." The promotion that now comes to him ends his second term of office at Salt Lake, marked by improved fares, reduction of duplicate trackage and installation of modern trackless trolleys—all innovations affording tangible proofs that Dan Green "has a way with him." It is a significant way, too, for the public soon finds out whether a public utility man is making good.

His first work in Salt Lake City came in 1915 as manager of the Salt Lake Division of the Utah Power & Light Company. A year later he was advanced to the job of general manager of the Fort Smith Light & Traction Company. Mr. Green's remarkable work in Arkansas as operator, public relations man, and organizer of statewide power distribution systems drew the favorable attention of Electric Bond & Share interests, so in 1923 he returned to Salt Lake City as vice-president and general manager of the Utah Power & Light Company.

Born in 1884, Dan Green grew up in the early exciting days of electricity. His predeliction led to his taking the electrical engineering course at Purdue University, from which he was graduated in 1908, following a judicious mixture of factory experience and college theory. After one month as a meter reader at San Diego in 1909, he was made manager of the commercial department. The next five years saw him serving as manager of electric properties at Albany and Marshfield, Ore., followed by a similar position with the Everett Gas Company, Everett, Wash.

In these days, when the problem of big business is to prove that it is really human, there is a great need, as well as a great opportunity, for men like Dan Green. That his promotion to headquarters has been well earned will be apparent enough to those who scan the records. Certainly Salt Lake City will miss Dan's enthusiasm and helpfulness, but the powers higher up have decided his talents should have wider scope.

A successor to Mr. Green will be named at the meeting of the directors of the Utah Power & Light Company scheduled for early in February.

S. E. Emmons in Foreign Field

Samuel E. Emmons, assistant general manager United Railways & Electric Company, Baltimore, has resigned, effective Feb. 1, to become associated with the American & Foreign Power Company, Inc., controlled by the Electric Bond & Share Company. Mr. Emmons will sail from New York on Feb. 9 to take up the management of railway properties owned and controlled by the American & Foreign Power Company, Inc., in the United States of Brazil, with headquarters in Rio de Janeiro.

Mr. Emmons is a son of Charles D. Emmons, president of the United Railways & Electric Company. He was born in Pittsburgh and was graduated from the University of Michigan with the degree of Bachelor of Civil Engineering in 1916 and then took up work with the Atchison, Topeka & Santa Fe Railroad. Later he became connected with the Pennsylvania Railroad at Pittsburgh. He joined the Fifteenth Regiment of Railway Engineers at the outbreak of the war and served as a second lieutenant. The regiment sailed for France on July 9, 1917, and was among the first contingent of troops.

Mr. Emmons was mustered out of the service in May, 1919, with the rank of captain and then re-entered the service of the Pennsylvania Railroad. He resigned his position with that company to become associated with Professors Cooley, Riggs and Anderson on valuation work. He became connected with the Ann Arbor Railroad as assistant chief engineer in April, 1920, and from that position he went to Baltimore in September, 1922, as assistant to H. B. Flowers, general manager of the company at that time. Mr. Emmons was promoted to the position of assistant general manager in April, 1924.

E. S. Haymond Promoted With West Penn

At a recent meeting of the board of directors, Edward S. Haymond was elected an assistant treasurer of the West Penn Power Company and the West Penn Railways. Mr. Haymond is a native of Indiana. He was graduated from Purdue University in 1914 and went to Pittsburgh shortly thereafter to take a position with the Westinghouse Electric & Manufacturing Company. In June, 1915, he became affiliated with the West Penn, his first work being in the statistical department which at that time was under the supervision of E. D. Dreyfus. During the World War, Mr. Haymond saw service with the air forces stationed at San Antonio, Tex. In February, 1919, Mr. Haymond returned to the statistical department and two years later was made statistician which position he held until February, 1928, when he was assigned to the treasury department as assistant to D. P. Guest.

E. J. Mehren Succeeds Wheeler Sammons with Shaw Company

Wheeler Sammons, who requested several months ago that, as soon as the reorganization of the A. W. Shaw Company was completed, he be relieved as senior vice-president and general manager, and his responsibilities changed to those of an advisory character, assumed this advisory position in the A. W. Shaw Company on Jan. 15. He will remain a member of the board of directors of the McGraw-Hill Publishing Company, Inc. E. J. Mehren will become vice-president and executive head of the A. W. Shaw Company and will continue as editor of the *Magazine of Business* and resident vice-president of the McGraw-Hill Publishing Company in Chicago. Mr. Sammons desires to give closer attention than it has been possible for him to do in the past to the development of his personal interests and publishing properties, which include the A. N. Marquis Company, publisher of "Who's Who."

A. P. Titus Goes to Illinois Terminal

A. P. Titus, chief operating officer of the Chicago & Alton Railroad, has resigned to accept the position of vice-president of the Illinois Terminal Railroad in St. Louis, affiliated with the Illinois Power & Light Corporation. He has been placed in charge of operations, entering upon his new duties on Jan. 16.

The Chicago & Alton has promoted S. P. Henderson, general superintendent, to succeed Mr. Titus, while Clarence W. Bearden, superintendent of transportation, was promoted to Mr. Henderson's old post.

The Illinois Terminal Railroad plans the construction of a $5,000,000 terminal in St. Louis, including a subway, surface and elevated lines. This work will be started soon and will fall in the sphere of Mr. Titus' duties.

J. H. Cain in Atlantic City

Former New York and New England operator appointed assistant superintendent of Atlantic City & Shore Railroad

JOHN H. CAIN, Boston, has been appointed assistant superintendent of the Atlantic City & Shore Railroad, Atlantic City, N. J., to succeed E. A. MacMillan, bound for São Paulo, Brazil, where he will have charge of transportation in a growing metropolitan section of the South American country.

The new assistant superintendent started in railway work as a conductor on the New York State Railways, Rochester Lines. Working his way up from the ranks, Mr. Cain became successively, motorman, inspector, chief inspector, superintendent of employment and instruction and assistant superintendent of transportation.

Following this foundation, he became train dispatcher of the Rochester & Eastern Rapid Railway; division superintendent and assistant to the general manager of the Hudson Valley Railway; superintendent and general superintendent of the Buffalo, Lockport & Rochester Railway; and general superintendent and manager of the Shore Line Electric Railway, Norwich, Conn.

When an appraisal of the Edmonton Radial Railway of Edmonton, Alberta, Canada, was undertaken, Mr. Cain was one of the railway men from the United States called across the border to assist in the preparation of the valuation report. He likewise did considerable field work, including a survey and appraisal, for the Toronto Railway, Toronto, Canada.

N. T. Brown Has Headquarters in Philadelphia

Nelson T. Brown, who since April 15, 1927, has been vice-president of the International Railway, Buffalo, N. Y., in charge of transportation, has moved his office to Philadelphia where he will be in closer touch with Dr. Arthur A. Mitten, of Mitten Management, Inc., and the Philadelphia Rapid Transit Company. Mr. Brown will continue to administer his duties in Buffalo, traveling between Philadelphia and Buffalo at frequent intervals.

Ohio Commission Appointees

Roscoe C. McCulloch has been appointed a member of the Ohio Public Utilities Commission by Governor Myers Y. Cooper. Mr. McCulloch served six years as Congressman and in 1920 was an unsuccessful candidate for the Republican nomination for Governor. He was special assistant attorney general of the United States, serving under three attorney generals, and was a member of the federal board created to review war contracts. He is a practicing attorney.

Frank B. Maullar, Mr. McCulloch's predecessor, was appointed in 1921 by Governor Davis. His term expired in 1927, but the Senate two years ago refused to confirm any one of three men named by Governor Donahey to succeed him. Mr. Maullar consequently has held office two years beyond the end of his term.

OBITUARY

Daniel Boal

Daniel Boal, superintendent of schedules and timetables of the Chicago Surface Lines, died in Evanston recently. He had been in the department for the past four years.

Mr. Boal entered the service of the Chicago City Railway, the south side lines, in 1902 as a window washer. Later he became transfer clerk, working nights, and during these years he attended the University of Illinois Medical School, and was graduated in 1906. In 1909 he went to Seattle, Wash., where he entered the mechanical department of the Seattle Electric Company, which operated a street railway and lighting system in that city. He was later transferred to the railway department in charge of traffic studies and schedules. He returned to Chicago in 1910 and entered the schedule department of the Chicago Surface Lines, resigning in 1919 to accept a position in the schedule department of the Philadelphia Rapid Transit Company. He was recalled to Seattle in 1920 but in 1923 again entered the services of the Chicago Surface Lines.

Although he held a doctor's degree and practiced for two years, his interest in street railway work was so great that he devoted his entire time to it.

THOMAS DUNCAN, founder and president of the Duncan Electric Manufacturing Company, died on Jan. 21, at Los Angeles, Cal. Mr. Duncan was one of the few men who saw almost the entire development of the electric meter and had been in intimate touch with all its phases. He was an inventor as well as an administrator and held about 200 patents. Born and educated in Scotland, Mr. Duncan came to America in 1883. Among the firms with which he was associated were the Sun Electric Company, the Fort Wayne-Jenney Electric Light Company, the Thomson-Houston Electric Company, the Fort Wayne Electric Light Company and the Siemens & Halske Company of America. In 1901, with several others, he organized the company which now bears his name. He was 63 years old.

FRANK E. JOHNSON, Chicago district sales manager of the Ohio Brass Company, died at his home in that city on Jan. 16. Mr. Johnson had been with the Ohio Brass Company for 21 years, all of that time in the Chicago territory.

Additional Improvements Announced

Public Service to spend $7,500,000 for transportation improvements. Fifty cars may be purchased by Brooklyn-Manhattan Transit Corporation. Track improvements to be made in Hartford

OUTSTANDING among improvement programs recently announced is the approval by the Public Service Corporation, Newark, N. J., of the budgets for 1929 of its subsidiary operating companies. The total budgets approved represent more than $34,000,000 of which more than $22,000,000 will be used by the electric department of the Public Service Electric & Gas Company for interconnection, transmission and distribution purposes. The gas department will spend more than $4,000,000 in the manufacturing and distribution branches of its organization.

More than $7,500,000 has been apportioned to the Public Service Co-ordinated Transport for equipment, track renewals, buildings and general items having to do with the improvement of the operations of electric street cars and buses. The major portion of the transportation appropriation will be used during the year for the purchase of buses.

Fifty Cars for Brooklyn

The Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., is preparing specifications for 50 new surface type cars. The details of these cars have not been completed but it is understood that they are to be for one-man operation. It seems that centre entrance cars are most desirable and that some difficulty is encountered in arriving at a decision as to which type of car is most suitable.

In a partial report to the Board of Public Service, St. Louis, Mo., the Condemnation Commission has recommended the North Twelfth Street boulevard improvement project to facilitate the construction of the Illinois Terminal Railway subway and elevated line, connecting a new terminal to be constructed at Twelfth Boulevard and Locust Avenue with the McKinley Bridge. It is recommended that 40 ft. of property be taken east of High Street from Morgan Street to a half block north of O'Fallon Street. It is beneath the additional 40 ft. that the railway will build its subway.

The commissioners for the entire project will not finish their report for another two or three years, but if a partial report is filed on the 40-ft. strip, the city would be able to take possession not later than at the end of six months. If the city should widen this street during the coming summer, the construction of the Illinois Terminal Railway subway would be advanced about two years.

The Board of Finance, of Hartford, Conn., plans a paving program for 1929 in which the Connecticut Company, New Haven, Conn., is involved to the extent of $244,000. This sum is the allotted percentage on eight of 25 streets to be paved, where the railway has tracks. In addition to this amount, the Connecticut Company will be asked to spend $26,000 for track work in connection with the widening of North Main Street. The Connecticut Company has been in conference with city officials and has suggested that the railway may find it hard to fill its part of so large a program, due to problems the company faces throughout the state. The city has been assured, however, that the Connecticut Company would do its best to take care of its share of the work.

Two major projects for the current year are now being undertaken by the Memphis Street Railway, Memphis, Tenn. One of these, on which work has already been started, is the rebuilding of the line on Poplar Avenue from Third to Dunlap Streets. This construction will require about six months and will cost approximately $90,000. The old rail is being removed and new 9-in., 134-lb. rail is replacing it. Plans for 1930 will probably continue this construction from Dunlap to Watkins Street.

The other major project which this company will begin work on in the near future is the reconstruction of the line on Hernando Street from Beale to Calhoun Streets. The 7-in., 70-lb. rail is being replaced by 7-in., 122-lb. rail. This project represents 2,400 feet of double-track reconstruction. The street is now paved with brick but the railway will pave between the tracks and for 24 in. along either side of the outside rails with asphalt. The project will require three or four months for completion and will cost approximately $40,000. Though these are the only projects definitely planned, they will probably be increased by work that will depend upon the city's program of improvements.

Milwaukee Track Relocation

Several grade crossings will be eliminated in the new $500,000 track relocation project on the Milwaukee-Racine-Kenosha rapid transit line of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. Six miles of track will be relocated within the next six months. The present tracks are adjacent to the pavement of highway No. 15, following its many curves. The new tracks will be placed about ¼ mile to the east on a recently acquired private right-of-way, parallel to and just east of the Northwestern Railroad passenger line. Grade separation is planned for four important crossings.

The new line will join the present route at South Junction, pass under highway No. 15 north at Ryan Road and pass over Ryan Road and the Northwestern line. This will eliminate present grade crossings over Ryan Road at the highway intersection and will avoid two diagonal grade crossings with highway No. 15. Another improvement will be effected at Ives subway where the line will cross overhead, permitting widening and realignment of the highway which now takes a sharp dip and reverse curve. Ultimately the entire line, except where it passes through Racine and Kenosha, will be on a new right-of-way remote from all highway traffic. Two miles of grading has been completed at the south end of the new road.

Cars Rebuilt in Oakland

The Key System Transit Company, Oakland, Cal., has rebuilt three street cars and three transbay cars for operation as experimental cars giving greater comfort and less noise. Aside from shimming the trucks and bodies of the cars and air compressor equipment with a noise and shock absorbing material, the cars have been completely refinished. Among the types of new fittings installed are deep cushioned individual seats, new window sash arrangements that afford more spacious windows and greater vision for the passengers, industrial carpet on the floors, a new stop buzzer system and modern illumination.

The Denver Tramway Corporation, Denver, Col., has recently ordered 500 trolley ears, 12 in. long for No. 00 round trolley wire and 500 trolley ears, 12 in. long for No. 0 round trolley wire, 50 22-in. splice ears with ⅝ in. boss for No. 00 round wire, 100 renewable bronze 6-in. cam tips for No. 00 wire and 400 renewable bronze 2½-in. cam tips for No. 00 wire. This company has also ordered two Mack AB 25-passenger city type buses.

The Knoxville Power & Light Company, Knoxville, Tenn., plans an automatic power substation to cost approximately $75,000.

Although the City Council of Seattle, Wash., has voted an appropriation of $28,000 for the construction of the extension to the Beacon Hills street car line, the actual start of the construction is delayed, due to a vote by the City Council to amend the original ordinance providing for the extension. Upon a petition of residents living between Columbian Way and Graham Street for extension of the line to Graham Street, the Council has voted to grant this request. The amendment will set forth a new schedule of payment on the warrants for financing the line.

Steel Cars Barred on Old N. Y. Elevated

The New York Transit Commission's steel car committee has reported that all-steel cars are impractical for use on the old elevated lines of the city. The report, which has just been filed with the state board after months of intensive study, was prepared by a special group of engineers named by the commission to design a coach built entirely of steel, after the manner of subway cars, which would be light enough to be operated on the elevated structures and thus give those lines the same fire protection as that obtained in the subways. The group reports that it was found impossible to construct a car of sufficient rigidity and strength and of proper dimensions within the weight limitation required to make operation of a full ten-car train on the overhead structures safe. The committee consists of W. G. Gove of the Brooklyn-Manhattan Transit Corporation, J. S. Doyle of the Interborough Rapid Transit Company, William C. Lancaster, chief engineer of the Transit Commission, and H. N. Latey, equipment engineer of the Board of Transportation. They worked in conjunction with the representatives of several equipment companies including the Pressed Steel Car Company, the Standard Steel Car Corporation, the Pullman Company, American Car & Foundry Company and the General Electric Company.

The committee held out the hope that it might be possible to construct an all-metal car—provided some of the new light metals such as aluminum or duralumin were used in place of steel—but this would be of an experimental nature without engineering certainty as to its success. It reported that such an experimental car would cost in the neighborhood of $120,000—and no public board feels like spending that sum unless without assurances of success.

The report practically spells the doom of the drive to secure a light steel car for elevated work, although some of the transit commissioners still believe that a satisfactory car can be built.

With respect to Brooklyn the engineers were more hopeful. It is held that the Brooklyn lines can be more cheaply strengthened to hold steel cars. It is urged, however, that for this borough an effort should be made to bolster up the present structures sufficiently to carry the regular B.-M. T. subway car rather than seek to design a new lighter type.

It is pointed out that Broadway, Brooklyn, is already strengthened; that part of the Fulton Street line has been rebuilt, and that the only two other heavy passenger carrying lines that would have to be strengthened are Myrtle and Lexington Avenues. Referring to the construction of the Fulton Street subway to take the place of that elevated and the building of the Smith-Ninth Street tube, the report says:

"It is possible that the Fulton Street line will be taken down and that traffic on Fifth Avenue will be so reduced that this line may also be eliminated."

Exhibitograph No. 3

GAIN
Patronage and Profits
and
SAVE
by Exhibiting
at the
A.E.R.A.
Atlantic City
Convention
Sept. 28 to Oct. 4

NO OTHER MEANS IS SO EFFECTIVE IN TELLING YOUR STORY.

The city plans to hook the Smith-Ninth Street subway into the Culver line, and when these trains are carried to Manhattan through the Smith-Ninth Street tubes, rather than over the Fifth Avenue L, it is asserted that the carrying capacity of that elevated will no longer be necessary. The four-track Fourth Avenue subway already parallels it within one block and the new line, it is declared, will care for the remainder of its traffic.

Since the through traffic over the Brooklyn Bridge is falling off, it is reasonable to expect that within a short time it will be so small that it can be handled by means of shuttle trains. The Brooklyn elevated will end at Sands Street, where the shuttle would terminate on this side of the river. To provide for passengers seeking Manhattan points other than the end of the Brooklyn Bridge, an extensive transfer station would be erected where the combined Lexington and Myrtle Avenue lines cross Flatbush extension, and another where they intersect the new Smith-Ninth Street line at Jay Street, which will lead through the Cranberry and Jay Street tubes on the city's new subway system. The B.-M. T., in line with this, has already urged the construction of a transfer station at Flatbush extension.

Proposed Standard for Milling Cutters Issued

The American Society of Mechanical Engineers is distributing copies of the proposed American standards for milling cutters, which has recently been approved by the sub-committee of the sectional committee, on the standardization of small tools and machine tool elements. This proposed standard is being distributed for criticism and comment, and the committee will appreciate any discussion on the matter. Comments on this tentative form should be addressed to C. B. LePage, assistant secretary of the American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

The proposed American standard on milling cutters was developed by the sub-committees on the standardization of milling cutters through its sub-group on nomenclature, limits, keys and keyways, profile and formed cutters, after frequent meetings throughout the country, and after preparation of numerous drafts. The sectional committee consists of twenty members representing the Society of Automotive Engineers, the National Machine Tool Builders' Association, and the American Society of Mechanical Engineers, who are joint sponsors for the project under the procedure of the American Standards Association.

The proposed standards effect plain, side, angular, stagger-tooth, end mills, metal slitting, T-slot, and half side cutters, involute gear, stocking and fluting reamers and taps.

South Shore Receives Ten Cars

Delivery of ten cars ordered last May by the Chicago, South Shore & South Bend Railroad, Michigan City, Ind., has been made by the Standard Steel Car Company. These cars are of the two-man, motor-driven, interurban type, each seating 48 passengers. Each car weighs 133,600 lb., is 61 ft. long and 10 ft. 1¼ in. wide. These cars are similar to the ones recently ordered.

Individual easy seats of the bucket type, Pullman smoking compartments, wide aisles, large windows and low descending steps are important features. The bodies are of all steel construction with arch roofs and swinging end doors. The exterior finish is in orange and



One of ten double-end motor type cars recently delivered to the Chicago, South Shore & South Bend Railroad

maroon lacquer and the interior trim is finished in mahogany.

The trucks are each equipped with two inside hung motors and 36-in. rolled steel wheels. Plain type armature and journal bearings are used. Complete plans and specifications of these cars were published in the July 14 issue of ELECTRIC RAILWAY JOURNAL.

Timken Steel & Tube Expands

The Timken Steel & Tube Company, Canton, Ohio, has put into effect an expansion program for the coming year that will necessitate expenditures in the neighborhood of $1,000,000. A tract of land 200 acres in extent has been purchased, which extends 2 miles west of the company's present holdings. This will provide room for future expansion of the plant facilities on the present basis of straight line production.

Work has already been started on the first unit, a tube mill, which will be housed in a building 320 ft. wide x 420 ft. long. It is being erected at a cost of more than $500,000 for building and equipment. This mill will be completed and put into operation by April 1. Other extensions to the production facilities of the company will be made later.

Uniform Through Export Bill of Lading

Many questions have been raised concerning the use and practicability of the uniform through export bill of lading. Chambers of Commerce, individual shippers, and associations of various types frequently suggested to the Department of Commerce that there was a great deal of misconception and misunderstanding regarding this bill of lading. They requested that the department, after conferences with the exporters, railroads, steamship lines, freight forwarders, bankers, and others, who might be affected by the use of this document, publish a bulletin bringing out all of the basic facts regarding the uniform through export bill of lading, its practicability and the favorable and unfavorable factors experienced in its use in foreign trade. In this connection some 30 conferences with shippers, bankers, transportation interests, and others have recently been held at the offices of the Bureau of Foreign and Domestic Commerce.

The Bureau of Foreign and Domestic Commerce has now issued Bulletin No. 593, which is a revision of one on the same subject published in April, 1925. It not only discusses the general features of the uniform through export bill of lading, but also summarizes the experiences of shippers and others interested in foreign trade in 29 cities in the country, relative to the practicability of and the principal factors to be considered in its use. A new section, dealing with the acceptability and use of this bill of lading in foreign countries, is also of considerable interest.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	Jan. 29, 1929
Metals—New York!	
Copper electrolytic, cents per lb.	16.775
Copper wire, cents per lb.	18.875
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	48.625
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	0.975
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.75
Weatherproof wire base, N.Y., cents per lb.	19.5
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.5
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.2
Turpentine (bbl. lots), N. Y., per gal	.6375

Weekly Business Conditions

Check payments during the week ended Jan. 26 were smaller than in the preceding week but showed a considerable gain over the similar period of 1928, according to the weekly statement of the Department of Commerce. Steel plants were more active during the week than in either the preceding week or the corresponding week of the previous year. The output of crude petroleum, lumber and bituminous coal, covering the latest reported week, was greater than during either the previous week or the similar period of last year.

The general index of wholesale prices showed a further gain as compared with both the previous week and the same period a year earlier. Prices for copper, iron and steel averaged higher than in either prior period. Loans and discounts of federal reserve member banks showed a further contraction from the preceding week but were larger than a year ago.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923-25 = 100)

	1929				1928			
	Jan. 26	Jan. 19	Jan. 12	Jan. 5	Jan. 28	Jan. 21	Jan. 14	Jan. 7
Steel operations	110.5	109.2	110.5	110.5	101.0	97.0	93.0	88.0
Bituminous coal production	.....	120.4	*119.7	101.1	103.9	99.8	111.5	101.1
Lumber production	.....	102.3	96.4	74.5	103.2	101.4	97.3	72.7
Petroleum production (daily average)	.....	126.9	124.5	124.4	113.1	114.3	113.9	114.2
Bldg. contracts 37 states (daily average)	110.6	109.6	93.4	64.4	137.3	104.3	109.2	56.2
Price iron and steel, composite	87.6	87.5	87.5	87.6	85.6	85.3	85.1	84.7
Copper, electrolytic, price	.....	120.3	119.6	119.6	100.7	100.0	100.0	100.7
Interest rates, call money	145.5	169.7	154.5	200.0	90.9	97.0	100.0	115.1
Business failures	128.0	143.2	156.0	116.2	158.7	148.9	154.3	125.1
Interest rates, time money	177.1	177.1	174.3	182.9	100.0	102.9	97.1	97.1
Federal reserve ratio	89.4	86.5	85.5	79.9	96.8	93.8	91.2	86.7

* Revised.

Petroleum Industry to Hold Trade Practice Conference

A trade practice conference will be held in St. Louis, Feb. 11, under the auspices of the Federal Trade Commission, to discuss trade practices and formulate standards of business conduct for the petroleum and petroleum products industry. A general committee of the American Petroleum Institute, together with six regional committees covering the United States, is reported to have been working on a proposed code of practices and have held regional meetings. The American Petroleum Institute made application for the conference as sponsor for all branches of the petroleum industry, its board of directors and members representing collectively a preponderance of the total volume of petroleum products produced, refined and marketed in the United States. All members of the industry are welcome to attend, it is stated, whether or not they have received a formal invitation.

Among practices proposed for discussion are: Interference with existing contracts; substitution of one grade of product for another; lottery schemes; sales from trucks; regulation of loaning or leasing gasoline pumps, tanks, and equipment; and discontinuance of such practices as the building of driveways and other extraordinary free services, leasing filling stations at abnormally low rents, or subleasing of such stations for the purpose of price-cutting or rebating.

International Railway Tests Fuel Oil for Buses

If experiments now under way are successful, the International Railway, Buffalo, N. Y., will use fuel oil instead of gasoline in a number of its buses, according to Walter McCausland, director of public relations of the company. Mr. McCausland says that early tests have proved satisfactory, and that the oil would be entirely practicable for the 59 gas-electric buses of the fleet of 90 being operated.

Arrow Electric and Hart & Hegeman Merge

Effective at the close of business Dec. 31, 1928, by an agreement of consolidation, the Arrow Electric Company and the Hart & Hegeman Manufacturing Company, both of Hartford, Conn., have merged and become one corporation under the name of The Arrow-Hart & Hegeman Electric Company. This company will have two divisions: The Arrow Electric Division and the Hart & Hegeman Division.

Commercially these two divisions will operate independently through their own distributing channels. It is believed that this merger will result in new lines, more efficient manufacturing, better service to their customers and a better product.

Good Business



It is good business to equip cars with good hand brakes. Accidents are usually quite expensive. It pays to guard against them.

You won't get good brakes unless you specify them, and you won't get the best brakes unless you specify and insist on—.

PEACOCK
STAFFLESS BRAKES

For Peacock Staffless Brakes have five features that entitle them to their claims as the hand brake, but adapted to modern cars.



1 Light weight (72 lb.)

2 Maximum power (3000 lb. breaking pressure).

3 Minimum platform space required.

4 Never clog with chain.

5 Lowest maintenance and long life.

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890 Ellicott Square, Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.
General Sales Representatives: The Ellcon Co., 50 Church St., New York



You can profit from Firestone *Experience and Leadership in the Bus Tire Field*

From coast to coast operators of large bus fleets have standardized on Firestone Gum-Dipped Tires, obtaining lower tire costs and more freedom from trouble than they ever received before.

Such uniformly fine results could only be made possible by the most advanced tire engineering—by Firestone's special mileage-building processes such as Gum-Dipping—and by a well planned program of service that leaves nothing to chance. Firestone knows from many years of experience in the bus field that there is no mystery in good tire performance. It is a matter of building-in the extra miles at the factory—then rendering the kind of service that gets out those extra miles when the tire is put to work.

Call on the nearest Firestone Dealer for information about the tire service he is equipped to give bus operators. Or write our Home Office, at Akron, Ohio, and let us work out a special service plan for your particular needs.

MOST MILES PER DOLLAR

Firestone

Gum-Dipped TIRES

AUTOCAR ADOPTS LONG CLUTCHES ON ALL MODELS



The past performance of the Long clutch on the Model A Autocar has merited the adoption of Long clutches for their complete line.

Our engineering department welcomes the opportunity to cooperate with other manufacturers.

LONG PRODUCTS
Automotive Clutches
and Radiators

LONG MANUFACTURING COMPANY
DETROIT, MICHIGAN

LONG

He was the FIRST MAN *to set eyes on an* *ENTIRELY* NEW WORLD



LEEUWENHOEK—first of the microbe hunters. In a superstitious, tradition-shackled age, which still believed that witches caused disease, this Dutch janitor looked through his home-made microscope, saw the microbe world, and was the first man to learn the truth!

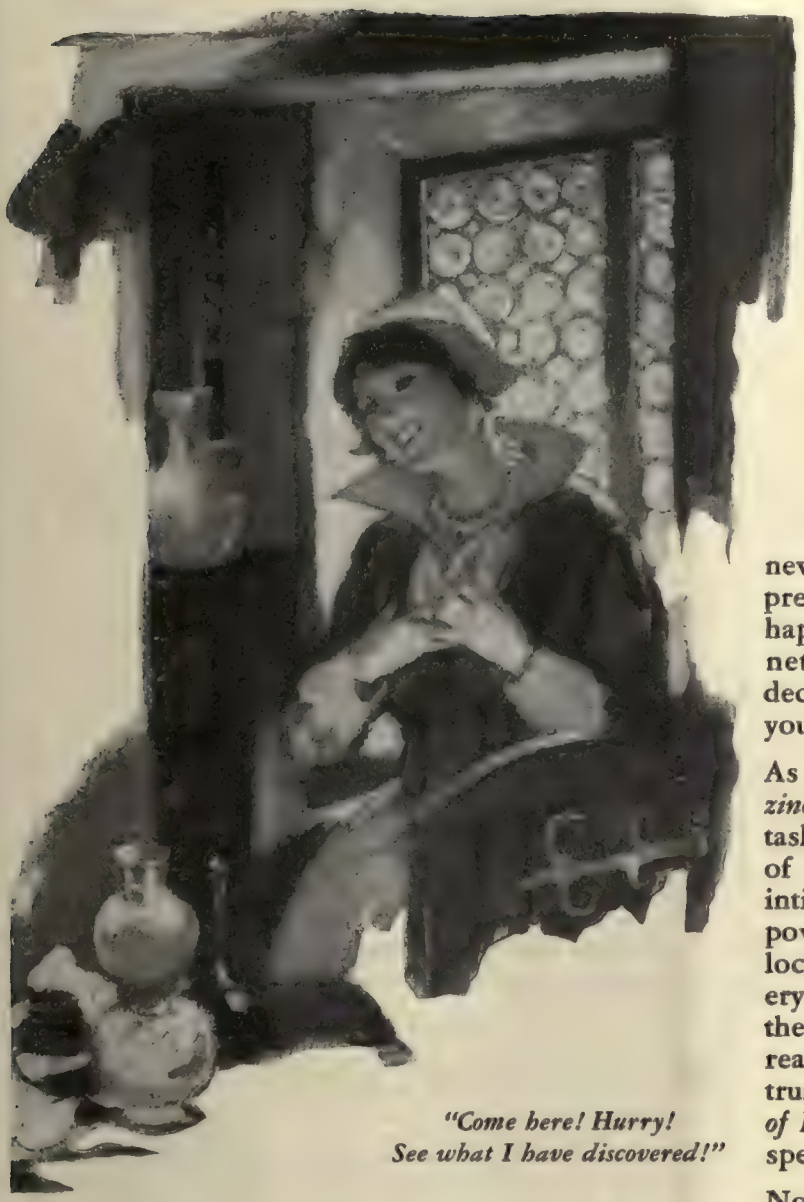
No instruments existed to aid Leeuwenhoek; he had to make his own. No codified knowledge to guide him; he pioneered his inspired way. But even Leeuwenhoek did not reason out the full effects of his discoveries. Had he done so, how much greater his contribution would have been . . . how much sooner the world would have materially benefited.

❖ ❖ ❖

After all, facts are of greatest value when used to determine consequences—especially in business. With old standards toppling and new standards rising, the consideration most vital to the directing heads of American business is the *effect* of Today's new

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The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



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Standard on 60 Railways for

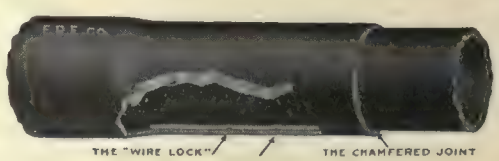
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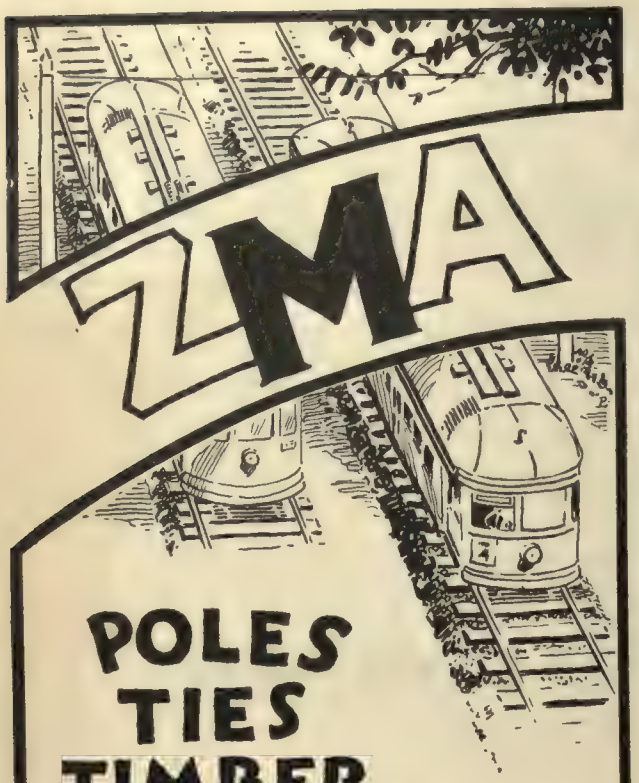
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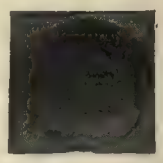
ZMA Poles are paintable. A company's distinguishing color or color combination can be placed on every pole. Every ZMA Pole will become a silent salesman for its owner—a creator of good will.

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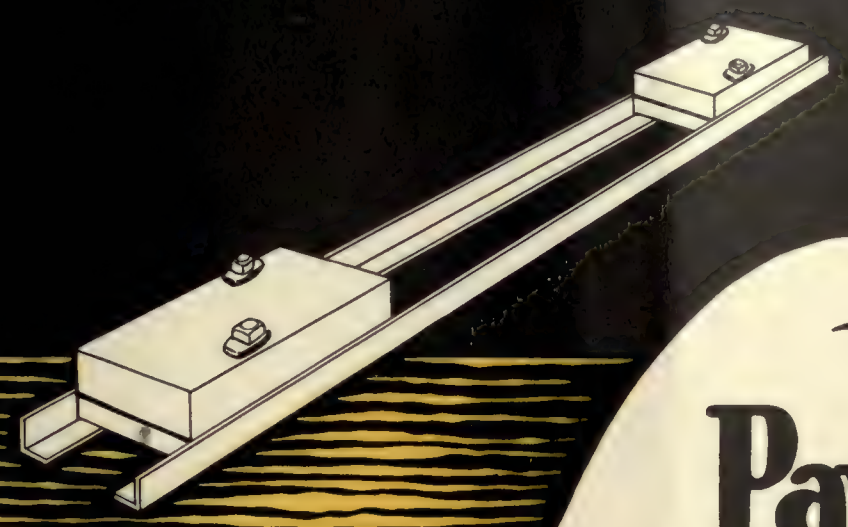
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Paved Track Is A Problem Requiring Original Thought

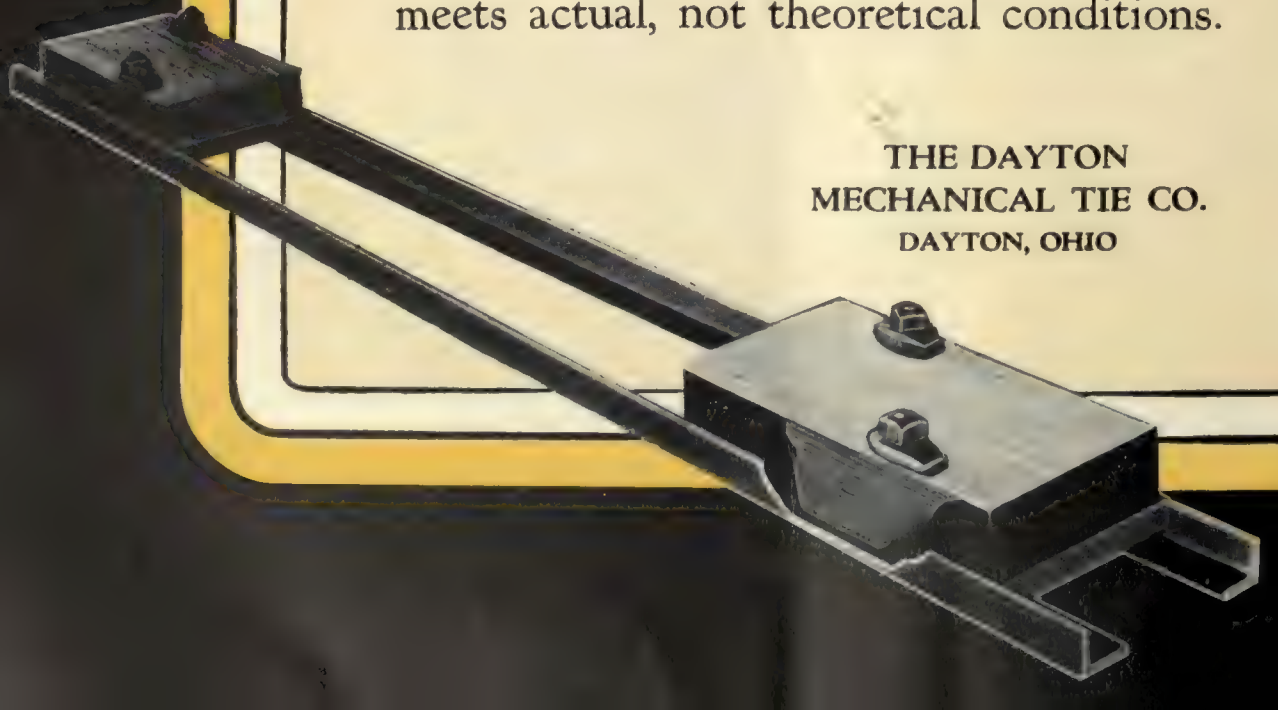
THE DAYTON SYSTEM OF INTEGRAL TRACK AND PAVING CONSTRUCTION

Paved Track Is A Problem Requiring Original Thought

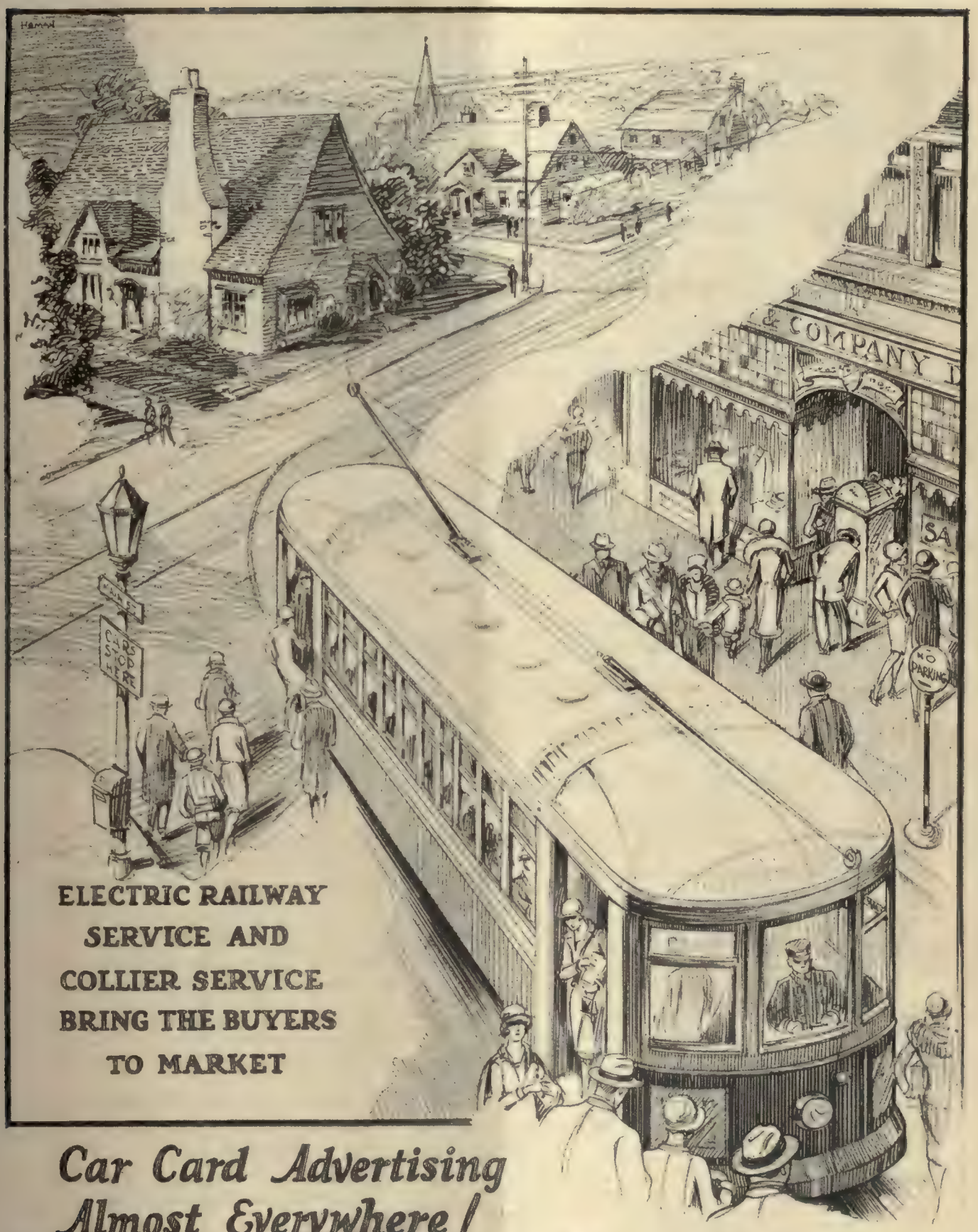
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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

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Westinghouse Air Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
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(See Brushes, Carbon)

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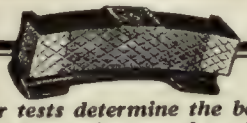
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Continued on page 38



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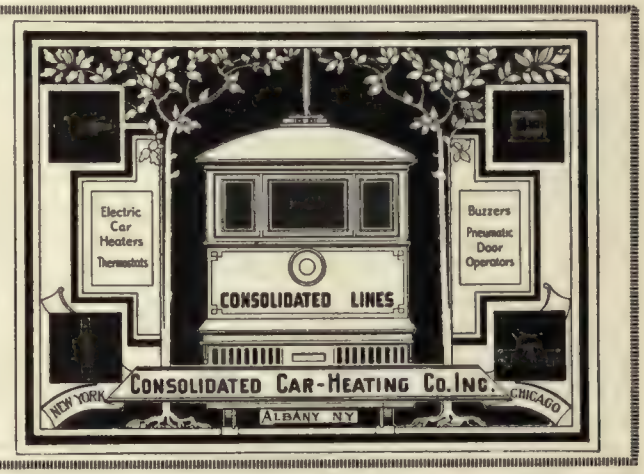
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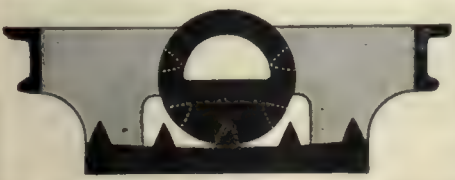
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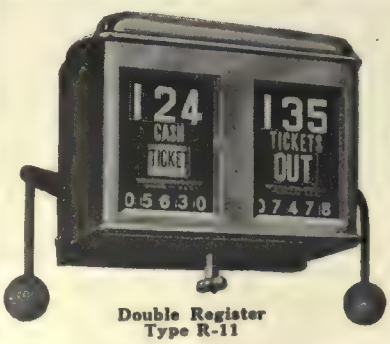
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Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc., The

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Brill Co., The J. G.
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Seats, Car (See also Rattan)
Brill Co., The J. G.
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Hale-Kilburn Co.
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Second Hand Equipment
White Co., The

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

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Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

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Slack Adjusters (See Brake Adjusters)

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Columbia Machine Works
Elec. Ry. Equipment Co.
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Westinghouse-Nuttall

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Works

Snow Sweeper, Rattan
Heywood-Wakefield Co.

Soldering & Brazing (See Welding Processes & Appar.)

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co., The
Wm. Wharton, Jr. & Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Sprinklers, Track and Road
Brill Co., The J. G.

Steel, Electric Furnace
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Steel, Open Hearth
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Steel and Steel Products
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Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
Roebling's Sons Co., J. A.

Street Cars, Passenger (See Cars, Passenger, Freight, Express, etc.)

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo Ajax Corp.

Switches
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Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie
Railway Track-work Co.

Tapes & Cloths (See Insulating Cloth, Paper & Tape)

Tee Rail Special Track Work
Lorain Steel Co.
Ramapo Ajax Corp.

Telephone & Telegraph Wire
J. A. Roebling's Sons Co.

Telephones and Parts
Elec. Service Supplies Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

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Consolidated Car Htg. Co.
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Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Ties and Tie Rods, Steel
International Steel Tie Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
Firestone Tire & R. Co.
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Trackless Trolley Cars
Brill Co., The J. G.

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety Stair Car Steps
Cincinnati Car Co.

Tree Wire
Okonite Callender Cable Co.
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Trolley Bases
Ohio Brass Co.
Westinghouse E. & M. Co.
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Trolley Bases, Retrieving
Westinghouse-Nuttall

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Twin Coach Corp.

Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wheel Bushings
Star Brass Works

Continued on page 40



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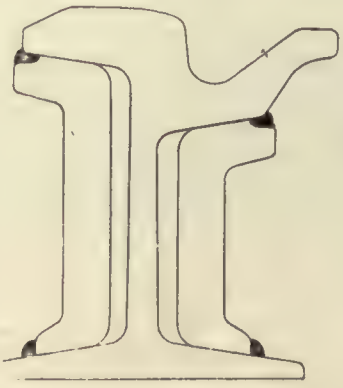


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ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

— A —

	Page
American Brake Shoe & Fdry. Corp.	37
American Brass Co., The	39
American Car Co.	Third Cover
American Insulating Mach. Co.	28
American Steel Foundries	16
Anaconda Copper Mining Co.	39

— B —

Beeler Organization	34
Bell Lumber & Pole Co.	39
Bemis Car Truck Co.	37
Bethlehem Steel Company	37
Brill Co., The J. G.	Third Cover
Buchanan & Layng Corp.	34
Byllesby Eng. & Management Co.	34

— C —

Carey & Co., Philip	20
Cleveland Fare Box Co.	37
Collier, Inc., Barron G.	33
Columbia Mach. Wks. & M. I. Co.	28
Consolidated Car Heating Co.	37
Curtin-Howe Corp.	30

— D —

Differential Steel Car Co., The	28
Dayton Mechanical Tie Co.	Insert 31, 32

— E —

Earll, C. I.	30
Electric Service Supplies Co.	7
Electric Ry. Equipment Co.	28

— F —

Faile & Co., E. H.	34
Firestone Tire & Rubber Co.	24
Ford, Bacon & Davis	34
"For Sale" Ads	35

— G —

General Electric Co.	22
Goodyear Tire & Rubber Co.	21

— H —

Hale & Kilburn Co.	39
"Help Wanted" Ads	35
Hemphill & Wells	34
Heywood-Wakefield Co.	17
Holst, Englehardt W.	34

— I —

International Register Co.	37
International Steel Tie Co., The	8, 9

— J —

Jackson, Walter	34
Johnson Fare Box Co.	39

— K —

Kelker, DeLeuw & Co.	34
Kuhlman Car Co.	Third Cover

— L —

Long Mfg. Co.	25
Lorain Steel Co.	29

— M —

McClellan & Junkersfeld	34
McGraw-Hill Pub. Co., Inc.	26, 27

— N —

Nachod and U. S. Signal Co.	37
National Brake Co.	23
National Carbon Co.	19
National Pneumatic Co.	15
National Ry. Appliance Co.	28
National Tube Co.	18
Nichols-Lintern Co., The	37

— O —

Ohio Brass Co.	5
Okonite-Callendar Cable Co.	39
Okonite Co., The	39

— P —

Pantasote Co., The	29
Perey Mfg. Co., Inc.	37
Positions Wanted and Vacant	35

— R —

Rail Joint Co., The	39
Railway Track-work Co.	6
Railway Utility Co.	39
Ramapo Ajax Corp.	39
Richey, Albert S.	34
Roebling's Sons Co., John A.	37

— S —

Sanderson & Porter	34
Searchlight Section	35
Smith Heater Co., Peter	39
Standard Steel Works Co.	30
Star Brass Works, The	28
Stevens & Wood, Inc.	34
Stone & Webster	34
Stucki Co., A.	37
Studebaker Corp. of America.	Insert 11-14

— T —

Timken-Detroit Axle Co.	Back Cover
Twin Coach Corp.	Front Cover

— U —

Una Welding & Bonding Co.	37

— W —

"Want" Ads	35
Wason Mfg. Co.	Third Cover
Westinghouse Elec. & Mfg. Co.	4
Westinghouse-Nuttall	2nd Cover
Westinghouse Traction Brake Co.	10
Wharton, Wm., Jr. & Co., Inc.	28
What and Where to Buy	36, 38, 40
Wheel Truing Brake Shoe Co.	39
White Eng. Corp., The J. G.	34
Wish Service, The P. Edw.	34

SEARCHLIGHT SECTION

Classified Advertising

Classification	Page
BUSINESS OPP.	35
EMPLOYMENT	35
USED AND SURPLUS EQUIPMENT	35
White Co., The	35

WHAT AND WHERE TO BUY—Continued from page 38

Trolley Wire
American Brass Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Truss Planks
National Tube Co.

Tubing, Steel
National Tube Co.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Turntables
Elec. Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co

Varnishes (See Paints, etc.)

Ventilators
National Ry. Appliance Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Htd. Co.
Nichols-Lintern Co.
Railway Utility Co.

Welded Rail Joints
Lorain Steel Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
General Electric Co.
Ohio Brass Co
Railway Track-work Co.

Welding Processes and Apparatus
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding Steel
Railway Track-work Co
Una Welding & Bonding Co.

Welding Wire
Railway Track-work Co.
Roebling's Sons Co., J. A.

Welding Wire and Rods
Railway Track-work Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Grinders
Wheel Truing Brk. Shoe Co.

Wheel Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tired
American Steel Foundries
Bemis Car Truck Co
Standard Steel Works Co.

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Star Brass Works
Westinghouse-Nuttall

Whistles, Air
Ohio Brass Co.
Westinghouse E. & M. Co
Westinghouse Tr. Brk. Co

Window Guards and Fittings
Cincinnati Car Co.

Wire Rope
Roebling's Sons Co., J. A

Wires and Cables
American Brass Co., The
Anaconda Copper Mining Co.
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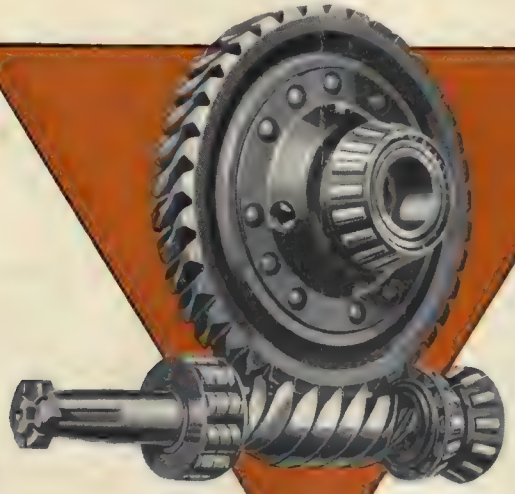
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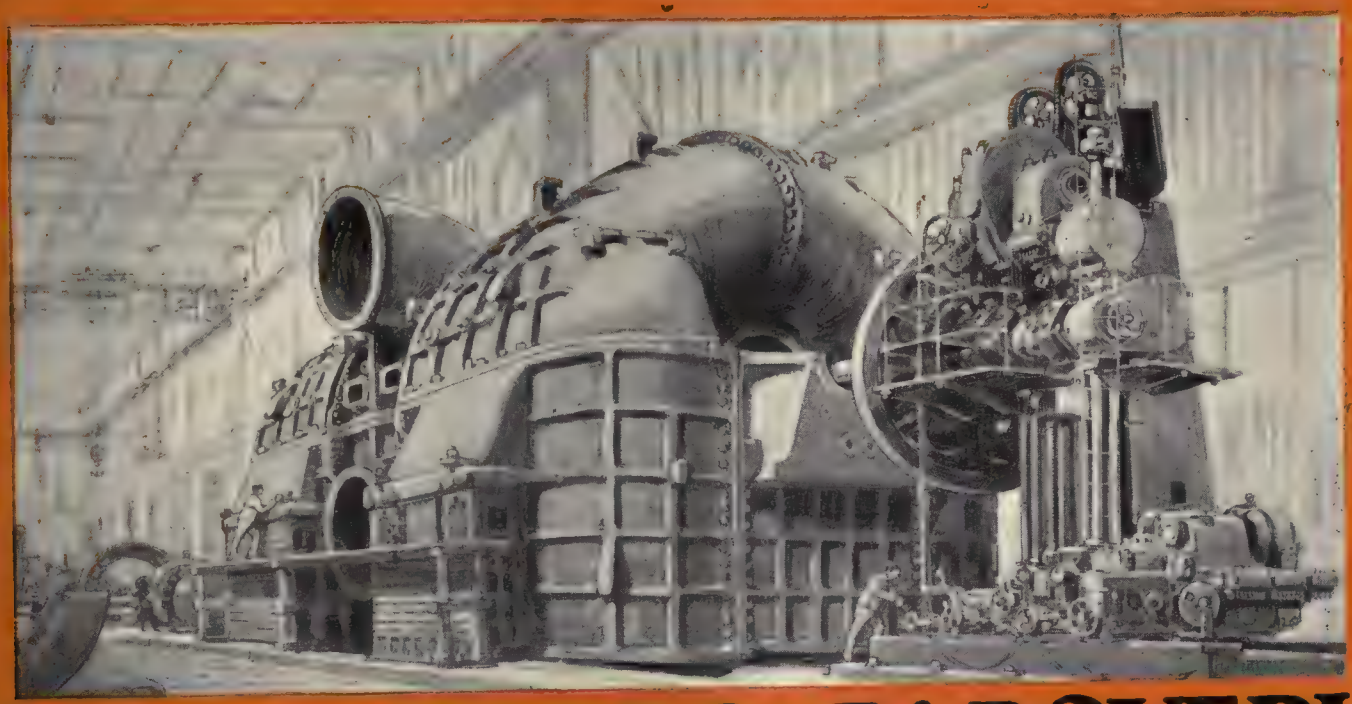
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ELECTRIC RAILWAY JOURNAL

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1929
Advertising Index—Alphabetical, 38; Classified, 32, 34, 36; Searchlight, 33

Vol. 73, No. 6 *Pages 229-268*

February 9, 1929

In This Issue

Editorials 229

Faster Movement of All Traffic Wanted—No Niggardly Policy Should Satisfy Detroit—New York Has Much to Learn from Other Cities—Putting the House in Order—Higher Schedule Speeds Are Essential—Taxation: Excessive and Unreasonable—Defilers of a Noble Profession—Community-Mindedness Is Needed

Trackless Trolleys Approved in Salt Lake City 232

By F. D. HEIGES

The author points out that riding has increased 30 per cent on the 4.43-mile line where the equipment is used, gives the operating details and describes the vehicles and overhead construction.

Six Ways to Obtain High Schedule Speeds 237

By G. M. WOODS

Speeds can be increased nearly 50 per cent, according to the author, by reducing the number of stops, standing time and car weight, and increasing the average line voltage, acceleration and braking rates.

New Philadelphia Subway a Vital Unit in City's Transportation System 240

This article shows the relation of the Broad Street subway to the other transit facilities of the city, gives operating details of the system and describes the general construction of the subway proper.

Seven Major Improvements in Louisville in 1928 236

Subways Are Costly, Engineer Advises St. Louis 239

Tide Water Safety Record Wins Another Brady Medal 249

Line Car for Lima Toledo Railroad 249

Extension of Freight Pick-Up and Delivery Service Recommended 250

Southern Equipment Men Discuss Maintenance Problems 251

Better Maintenance Through Improved Methods 252

New Equipment Offerings 254

News of the Industry 256

Public Hearings Begun in Chicago Looking Toward Unification—Fare Hearing in St. Paul Scheduled for Feb. 11—Another Bus-Car Service in Detroit—Annual Report of Washington Railway Shows Decline in Traffic—Large Track Construction Programs Are Planned—Subsidy Suggestion Among Akron Proposals

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A "Man-Hour" represents cash and is equivalent to 5.2 average fares.



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THE BASE OF MODERNIZATION



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Made in halves to halve your gear case costs

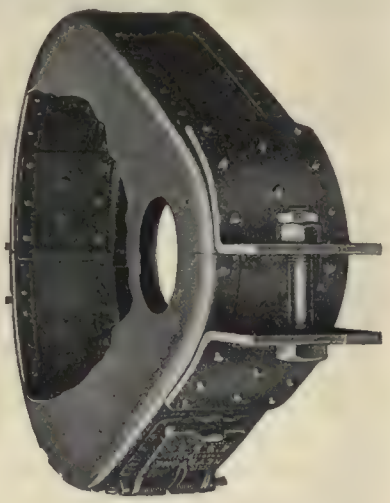
Keystone steel gear cases have largely replaced malleable iron cases for electric railway work because an accident usually causes them to bend rather than crack or break. Therefore, ordinary repairs can be made with a minimum amount of labor.

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Under View of Bottom Half



Showing External Construction



Showing Internal Construction



Inner View of Top Half

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MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



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50 Years' Experience	Skilled Workmanship
Efficient Organization	Scientific Treatment
Rigid Operating Policy	Chemical Control
Modern Facilities	Constant Research
Selected Timber	Time Tested in Service
Extra Long Poles	Permanent Identification
Proper Seasoning	Prompt Delivery

International produces, frames and treats poles economically in large quantity and renders a quick service of quality poles that is unexcelled in the creosoted pine pole industry. Your inquiries are invited.

International Creosoting & Construction Co.

General Offices—Galveston, Texas

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High Quality 2¢9 Creosoted Poles

"The International Dating Nail"



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those thousands
of passengers
you never carry?

De luxe, speedy service
street car and high



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DODGE MOTOR

SOLD BY DODGE BROTHER

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Dodge Brothers Parlor Coaches build up new class of riders who can be carried at a profit

DODGE BROTHERS Motor Coaches have pioneered and proved the new field for public transportation—offered by the rider who wants the speed, comfort and convenience of a taxicab for little more than street car fare.

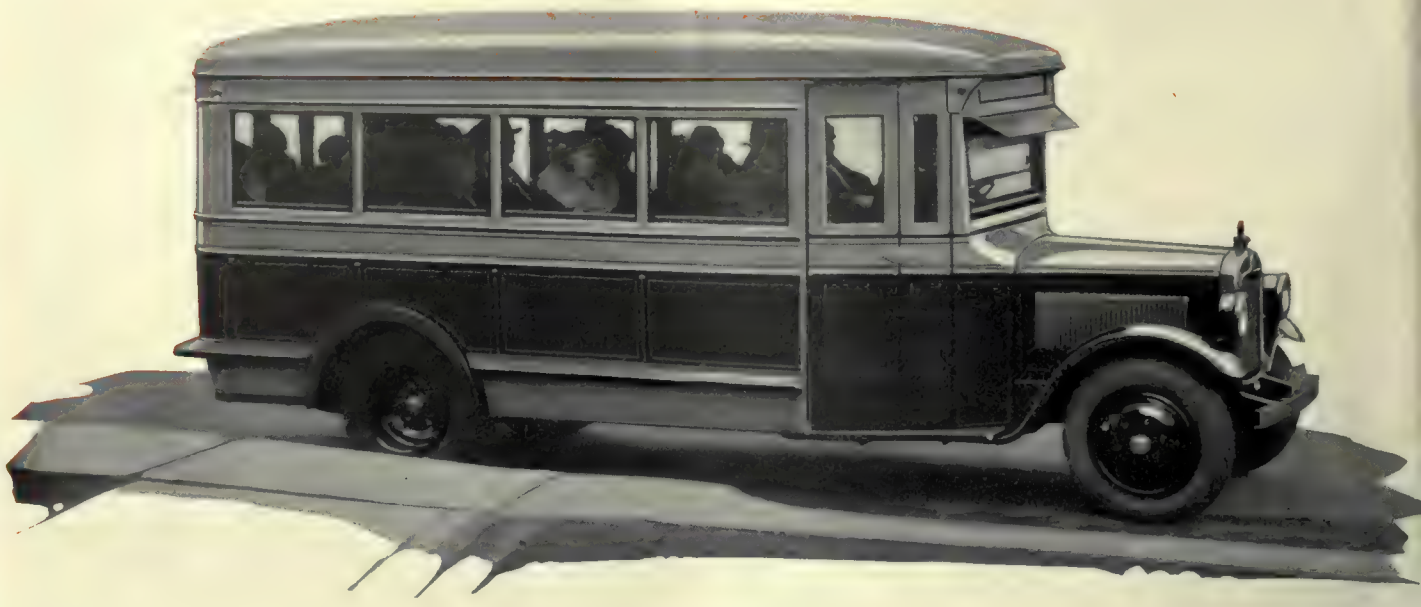
In proving the field, they have also proved that Dodge Brothers 16-passenger Parlor Coach is the successful vehicle in this field.

It is fast, powerful, safe, quiet and comfortable. Its fine appearance attracts riders. Its sturdy, simple construction keeps operating costs exceptionally low.

Dependable, low-cost operation is the story of Dodge Brothers Motor Coaches everywhere—in large cities or small, in de luxe service or regular bus work.

BROTHERS COACHES

DEALERS EVERYWHERE



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The complete line of Trucks, Buses and Motor Coaches which Dodge Brothers have been manufacturing and selling under the name of Graham Brothers now takes the name of their makers—Dodge Brothers.

These Trucks, Buses and Motor Coaches have always been powered by Dodge Brothers engines. For years they have been built of Dodge Brothers parts in Dodge Brothers plants according to Dodge Brothers standards.

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OPERATORS continue to express their approval of Dodge Brothers street car type Motor Coaches by purchasing more of them.

The new sales record made in the year just closed is endorsement of satisfactory performance.

Six cylinders . . . . . 4-speed transmission . . . . . 4-wheel brakes . . . . . 3-stage rear springs . . . . . fine appearance . . . . . body as well as chassis Dodge-built . . . . . Let us show you how your requirements can be met by the street car type coach—at a lower operating cost. See your local Dodge Brothers dealer or write direct to Dodge Brothers, Detroit.

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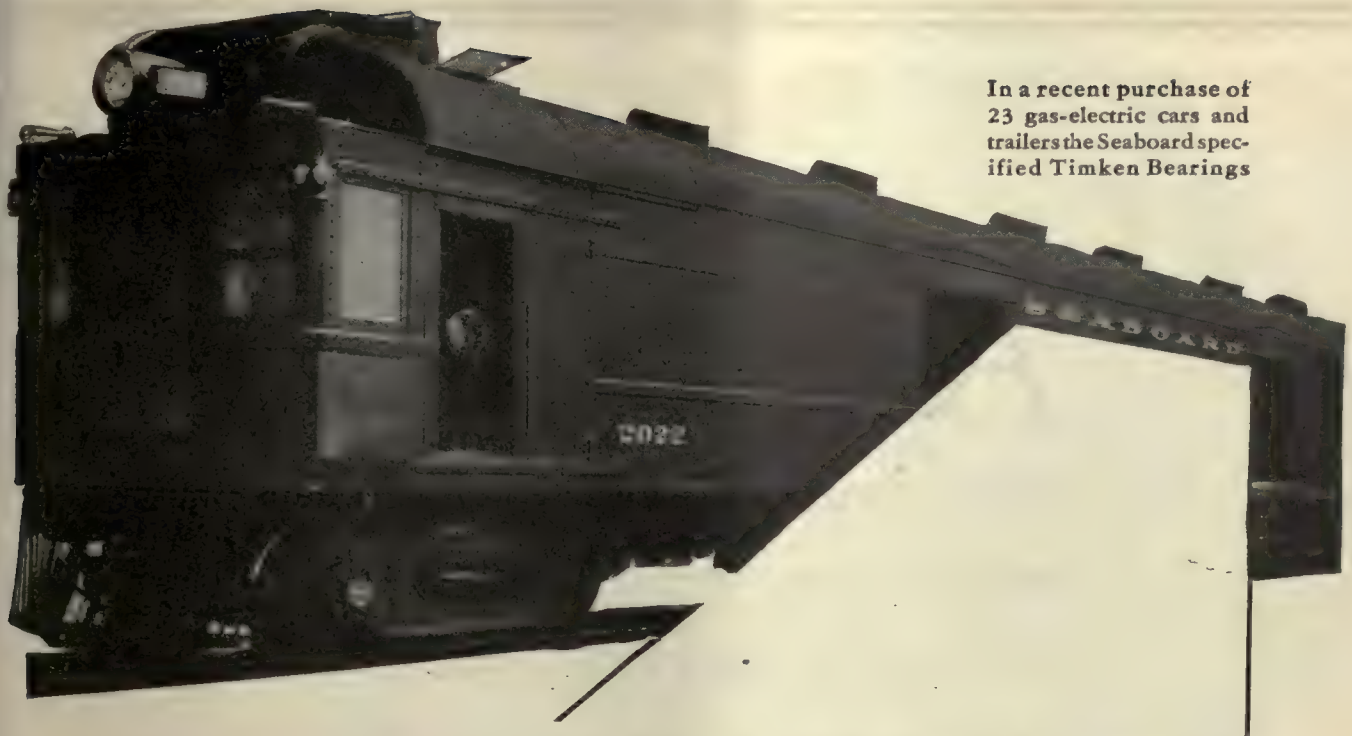
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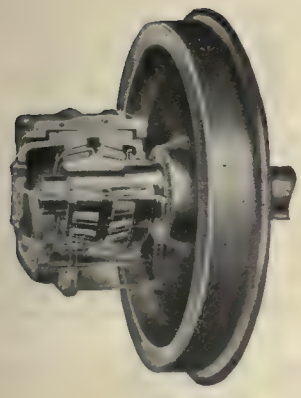
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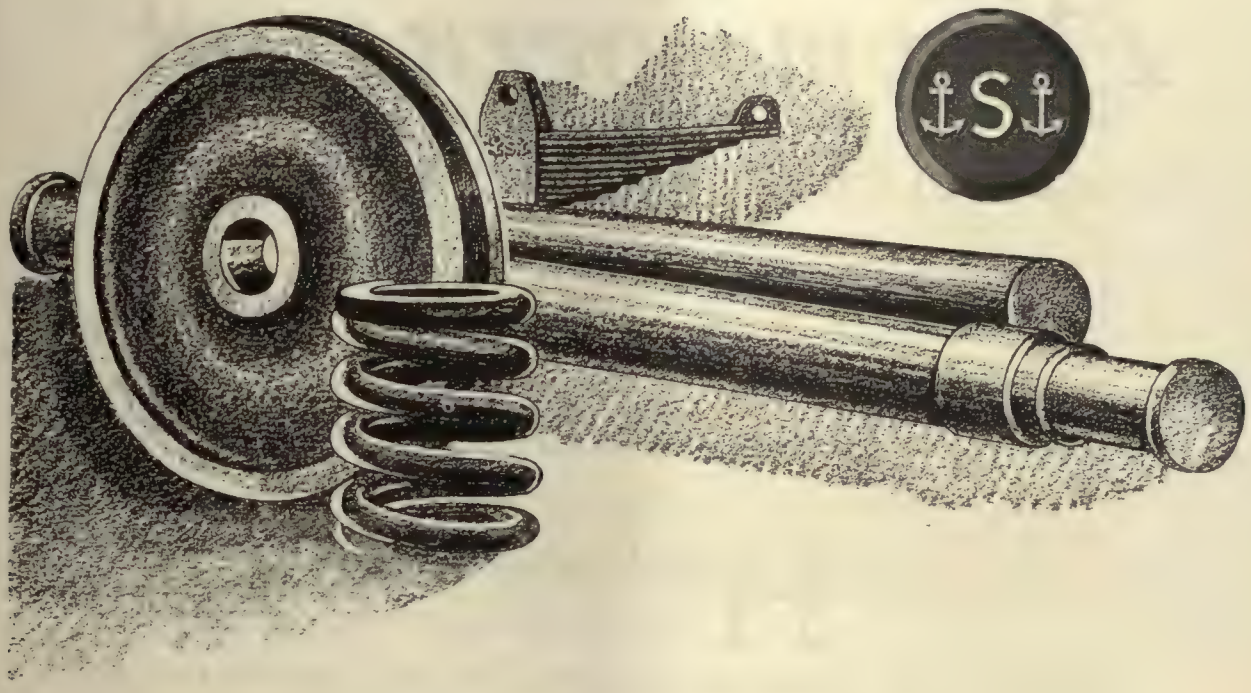
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Faster Movement of All Traffic Wanted

FROM the welter of ideas concerning proper regulation of traffic a few major points are beginning to stand out prominently. Chief among them is the fundamental principle that all such regulation must be based on the needs of the community as a whole rather than on the wishes of a few individuals or groups. Progressive electric railways are taking an active part in the campaign for better regulation; not with the selfish idea of advancing their own interests, but rather with the hope of securing faster movement of all traffic.

In the past, too many people have been thinking of traffic regulation entirely from the standpoint of their own convenience. Many of those who ride habitually in their own automobiles, giving no thought to the needs of the majority, have contended that the public transportation vehicles, particularly the trolleys, should be taken off the streets. On the other hand, public transportation men sometimes have favored overly severe restriction of the use of the streets by private automobiles. Neither of these extreme views is practical. As long as some 16,000,000,000 passengers are being carried every years by the trolleys and buses of the local transportation systems in this country, it is evident that these vehicles cannot be taken off the streets. At the same time, there are more than 20,000,000 private automobiles in the United States, and they, too, must be allowed to make reasonable use of the streets.

Stringent regulations are justified when and where they contribute to the better movement of traffic, but when they are merely inconvenient without also being beneficial they have no justification. In other words, traffic regulations must be fitted to the needs of the situation, and they must be based on the greatest good for the greatest number. Both public and private transportation vehicles must continue to use the streets, and the problem is to devise regulations such that they both can move with reasonable comfort, safety and speed.

No Niggardly Policy Should Satisfy Detroit

RAPID transit for Detroit has been revived as a live issue. Re-agitation of the subject just at this time has nothing to do with the controversy over the jitneys, but the subject has reappeared at a time when Detroit is stirred to the depths transit-wise. Nearly everybody has a remedy for the transit ills that have come in the wake of the growth of the city to a metropolis of more than 1,000,000 inhabitants, but nobody seems to do anything about it. Plan after plan goes into the discard or is permitted to languish in desuetude. The so-called Waldon plan of the Rapid Transit Commission has now been revamped and there is talk of it being put before the voters in the spring. However much one may be inclined to differ with the report as to its details, the plan as advanced is comprehensive, but its advocates appear to be in for a period of opposition.

Detroit can hardly afford to subscribe to any plan of expedients. It has waited a long time now, but it would be better to wait still longer than for the city to accept any compromise on this issue. Whatever work of this kind is done should be carried out on the broadest possible lines, lines that take into account the remote rather than the immediate future. It is going to cost Detroit a lot of money to secure a system fitted to the city's real needs, but it will cost the city still more if it should perchance blunder into a program not sufficiently generous in its conception to take fully into account future requirements. Detroit's real need is not the need of a day. There should be no attempt to deal with the matter in any way that does not carry reasonable assurance that any start made at this time can be expanded to meet the needs of a future Detroit of 2,000,000 people.

New York Has Much to Learn from Other Cities

NOW that the attention of New York City's new Police Commissioner seems to be momentarily diverted from the suppression of crime and the smashing of speakeasies to the regulation of street traffic and the relief of traffic congestion, and a citizens' committee representative of the entire city has been organized to deal with this same baffling question, it would appear timely to call attention of the interested parties to the fact that New York City can learn much by condescending to look beyond the limits of its own borders. A number of local traffic problems to which the average New Yorker is inclined to refer as unique and unusual are neither the one nor the other. There is scarcely a situation in the city involving traffic congestion that is not experienced to a greater or less degree in other cities in the land. And in many of them the difficulty is in a fair way of finding a solution. In a recent address before the Metropolitan Section of the A.E.R.A., Col. A. B. Barber, manager Transportation and Communication Section, Chamber of Commerce of the United States, brought this point out quite clearly.

New York, for example, has a much lower proportion of automobiles to population, less than one-third the ratio, in fact, of Los Angeles, and yet in the California city the adoption of modern traffic control methods, which New York has been reluctant to consider, was followed almost at once by an increase in the vehicular movement of more than 30 per cent. In Chicago's Loop District, where conditions a few years ago were possibly worse than on Manhattan Island, a series of measures has been adopted which has speeded up traffic in this district by from 25 to 50 per cent, in addition to which there has been, since the regulations went into effect, an increase of 18 per cent in the use

of private automobiles. A modern system of motor vehicle administration, in which respect New York has been strangely lacking, has resulted in a considerably lower accident record in communities where it is enforced. There is a crying need for standardization in the ordinary rules of the road, and in this respect, too, New York State and more particularly its greatest city, are far behind the times. "I sometimes hear it said," remarked Colonel Barber in his recent address, "that New York's traffic situation is so different and peculiar that experience elsewhere is of little value. Personally, however, I doubt the correctness of this assumption." At another point he said, "Certain cities have shown a curious tenacity or individualism in clinging to certain peculiar traffic rules or regulations in spite of the availability of well worked out and recognized standards which are being successfully applied elsewhere."

And so when New York sets out seriously to devise ways and means of relieving its traffic tangles—if that is what the bally-hoo on the subject really portends—its efforts will not be entirely of a pioneering nature. There is already a considerable accumulation of experience and precedent for guidance, as well as qualified authorities to whom to turn.

Putting the House in Order

IN ALL of the discussion that has taken place relative to modernization and rehabilitation as steps in the process of restoring the electric railway industry to its proper place, much has been said about the necessity for the establishment of credit as an all-important preliminary. Ability to borrow money for needed improvements is based primarily upon anticipated earning power, and it is quite in order to prepare statements setting forth the economies that can be effected and the increased earnings that can be expected as the result of the proposed schedule of betterments. The character, integrity and managerial and engineering skill of the organization back of the property are also determining elements, but of even greater importance is the necessity for presenting a properly balanced capital structure.

Too many properties with promising prospects and crying needs for improvement and modernization are handicapped at the very start by a load of interest-bearing obligations out of all proportion to any possible ability to pay. If to meet interest payments the credit of the company is so curtailed that funds to make necessary improvements cannot be obtained, the integrity of the property is threatened. Often it can be shown that the ultimate value of the security actually can be enhanced by making a temporary sacrifice. If every possible economy has been introduced and there still remains a staggering burden of interest to pay, the management has not performed its whole duty until an effort has been made to reduce this charge as well. Of course, this is unpleasant medicine to take and the security holder is likely to balk at the suggestion. But, after all, is it any more unreasonable to ask a security holder to accept a junior position for his investment in the hope that its value will thereby be made more secure than it is to urge a patron to pay a higher fare to the end that better service may be given?

It is only fair to admit that the process of voluntary readjustment of a capital account is a very intricate and difficult undertaking. But the task should not be avoided because it is difficult. The best legal talent obtainable has been enlisted to secure the modification of onerous franchise requirements and permit of the raising of fares. Financial direction of equal ability is available for the task of making the securities a sounder investment.

Higher Schedule Speeds Are Essential

SPEED, always a primary factor in the art of transportation, never has been of such importance as it is today. The private automobile bases its appeal not alone on comfort and luxury but on its ability to take its passengers from place to place in minimum time. That point is emphasized by G. M. Woods in his article on another page. In comparison with automobiles, street cars in many cities are too slow—a criticism that is not confined to any one route but to whole systems. That this situation should exist today is the more remarkable when it is considered that the electric vehicle has no inherent limitations in power or possible braking rate.

It will not do to dismiss the subject with the excuse that street cars go as fast as the traffic, or to suggest that if the city will relieve traffic congestion the cars can go faster. Mr. Woods points out six factors that influence city schedules. These are the number of stops per mile, the standing time, the average voltage, the rates of acceleration and braking, the gear ratio and the weight of the vehicle. Every one of these is within the control of the operating company. Some of them, of course, cannot be changed except at considerable expense, but the others can be modified with little cost.

Stopping places can be relocated to advantage in many cities. Where stops can be reduced in number without losing patronage the change should be made in the interest of better service. But it is in the operation of the cars themselves that the greatest opportunity exists for an increase in speed. Nearly all cars have sufficient motor power to permit of accelerating rates much higher than those in common use. As Mr. Woods points out, many cars are overpowered if the rates of acceleration are to remain in the vicinity of 1.25 m.p.h.p.s. Proper instruction should result in a marked increase of acceleration. The same is true of braking. If a braking system is designed to work up to the limit of sliding the wheels, for emergencies, there is no reason why it cannot be worked reasonably close to this rate right along. All that is essential is that the inspection should be rigid and the brakes kept in first-class order. By using these higher rates of acceleration and braking the car speed can be increased between 10 and 20 per cent. With proper attention to power saving, the total energy consumption with this method of operation is actually less than when the car is allowed to drag along.

The simplest and the most direct way to increase the speed is to reduce the standing time at stops. It costs nothing save alertness on the part of the operator. Granted that cars are equipped with adequate power and efficient brakes, riders, pedestrians and traffic officers are influenced by the attitude of the platform men. When trainmen are alert, passengers get on and off quickly, pedestrians keep out of the way, and automobile drivers respect the street car that is ready to move. With all of these factors given proper attention, schedules may be raised from say 9.5 m.p.h. to 13.5 m.p.h., or more than 40 per cent, as Mr. Woods points out. Thus a great deal can be done not only toward improving car service, but also toward removing the present complaint that the street car is slow in comparison to the other vehicles on the street.

Taxation—Excessive and Unreasonable

SO OBVIOUSLY unreasonable and unfair are some of the taxes which have been heaped upon the electric railways that the temptation is strong to place chief emphasis on this phase of the matter when endeavoring to secure relief. But, after all, it is the excessive total burden imposed rather than the peculiar character of any individual item that hurts the railways. Taxes to pay for pavements which the railways do not use, taxes for the upkeep of public parks which are of no benefit to the local transportation company, and the like, though wrong in principle would be less objectionable if they were moderate in amount and if they were the only taxes imposed. The fact is, however, that they are only part of the burden. Franchise taxes, gross receipts taxes, licenses of one sort and another, real estate taxes and various others must be paid, too.

Unfortunately the peculiar character of the taxes which are imposed upon the railways works to their disadvantage in securing relief. Business men are extremely sensitive concerning forms of taxation to which they themselves are subject. The business man, however, does not have to pay a franchise tax nor a paving tax, nor a gross receipts tax. While he may admit the injustice of imposing such burdens upon the railway, he sees no danger of their being imposed upon himself and it is difficult to arouse his interest in measures for relief. On the other hand, if the tax burden of the railway was of the same nature as that of ordinary business, the business man would quickly see the unfairness of taxation ranging as high as 12 to 15 per cent of the gross revenue.

To secure the co-operation of the public in measures for relief, therefore, it is necessary that the extent of the total taxes on the industry be driven home in the public mind. The important fact is that electric railways carry a tax burden that is out of all proportion to those of other industries, and are seriously handicapped in their efforts to give satisfactory transportation service by this unjust and unreasonable situation.

Defilers of a Noble Profession

MANY proposals have been made to overcome the evils of the ambulance-chasing lawyer, but the most propitious appears to be the one intended to admit to the bar only the men best qualified to practice before it. This was among the suggestions made by William D. Guthrie, president of the New York Bar Association, following the recent hearings on ambulance chasing in New York, and referred to by Frank E. Carstarphen in his paper before the American Electric Railway Claims Association in Cleveland last fall. More recently this need has been reiterated by Prof. I. Morris Wormser in an address presented at the annual meeting of the New York Bar Association on. Jan. 19.

Men dishonor a profession who resort to practices lower than those of the level of the guttersnipe, and it is difficult to believe that practitioners before the bar who resort to such activities as have recently been disclosed in New York and not infrequently elsewhere would ever have survived an adequate scrutiny of character or education in professional ethics as a prerequisite of admission to the bar. Nor does this mean that corporation attorneys disposed to fight fire with fire deserve exculpation. But this is not the only branch in which practitioners offend. The devices of the ambulance chaser are employed in other fields of the law, notably the solicitation of criminal cases and of condemnation proceedings.

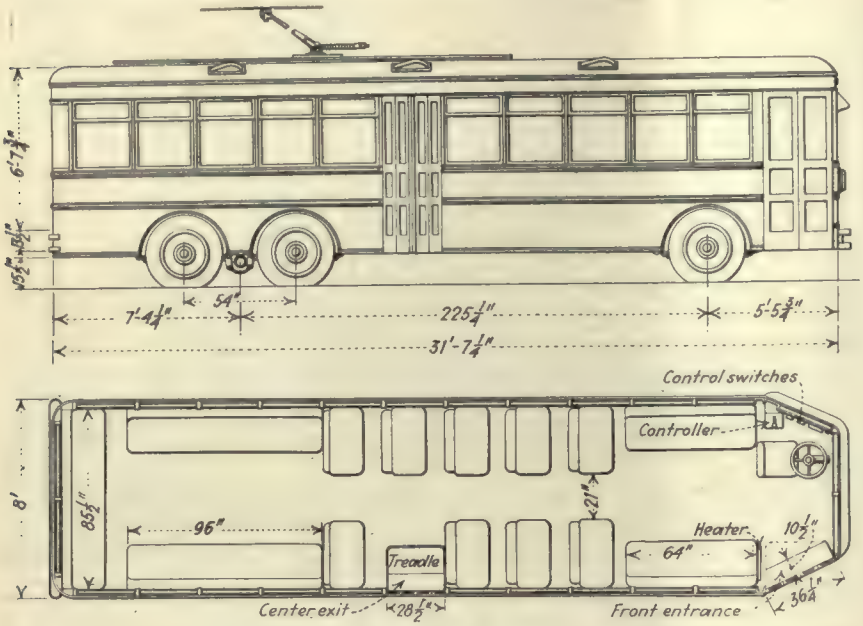
What seems to be needed most is a standard of admission to the bar that in addition to increased scholastic attainment shall contemplate a strict examination into the character, background and environment of applicants for admission to the law schools. In no other way can a guard be placed against the evils of an overcrowded and an uneducated bar, since a bar so constituted tends to be a weak bar, a cowardly bar, and too often a crooked bar. These are strong words, but the occasion demands them. Knowledge of legal ethics is not inborn. Laws schools should place more emphasis on the teaching of legal ethics than they now do. If this were not true, it would not have been said that the 74 men recommended for disciplinary proceedings in connection with the ambulance-chasing investigation in New York came to the bar lacking in the environment, the background and the education to make them fit members of this profession.

Of course, no profession deserves to be condemned because a few shysters practice it who have met the accepted qualifications of the day—and a shyster at heart may be successful in taking all the hurdles of the most rigid requirements—but it does seem that, after all, the best way of raising the standards of the profession is the way of Mr. Guthrie and of Professor Wormser, namely, "Fewer Lawyers and Better Ones."

Community-Mindedness Is Needed

NEED for thinking in terms of an entire community rather than of a limited district is seen in a recent report of the Regional Plan of New York and Its Environs. This body feels it is too obvious to need any argument that a growing community, which is constantly having to make physical provisions for its growth, can do better if it keeps its total needs constantly in view than if it shuffles along blindly without much regard for them. Yet so obstinate is the habit of building in terms of the municipal subdivisions, which are the political fractions which make up the whole, that too little heed is paid to those things which transgress and transcend municipal boundary lines. In nothing is this narrowness of viewpoint more damaging than with respect to transportation.

In obtaining co-operation between the various governmental units for regional planning, which is believed to be particularly necessary in such things as the planning of highways, transit facilities and public utilities, some form of control should be established. A good example of such control is the Port of New York Authority, which, in the face of great difficulties, has done much to unify the port and to increase its value to the entire country as well as to the states in which the port lies. There is every reason why such planning in any community should be done by a similar independent body which has the vision and the courage to investigate regional problems and to administer them wisely. As the Regional Plan sees it, while such boundaries of influence may result in a certain measure of overlapping of political jurisdiction, the history of commissions to which have been delegated similar special powers does not reveal that this overlapping has been seriously detrimental. In fact, it has been far less harmful than the confusion and lack of co-ordination which previously existed with many local political units.



Side elevation and floor plan, showing the seating arrangement and the principal dimensions

Prior to assembly each coach frame was mounted on its axles and wheels and subjected to a total uniformly distributed floor load of 17,500 lb. The greatest temporary deflection was only ⅛ in. and there was no permanent set.

Distinctive Color Scheme Selected

The color combination for the exterior of the coaches was selected only after several schemes had been prepared and exhibited to groups of men and women, and a preference stated by the majority. While the buses could have been finished in the standard orange used on the street cars, it was thought that the electric coach was a transportation vehicle different from the street car and that this could best be brought out by painting it a distinctive and different color. In doing this, however, a combination had to be provided that would give maximum visibility and a harmonious, rich and pleasing effect, as well as satisfactory service from the standpoint of durability. The final choice was a combination of amber brown and canary yellow for the body and a terra cotta red for the roof.

The drive is through a double reduction gear from two Westinghouse 50-hp., 600-volt, direct-current motors weighing approximately 800 lb. each. They give an acceleration of 3 to 3½ m.p.h.p.s. and an average running speed of 30 m.p.h. Each motor is mounted in front of one of the two rear axles. The motors hang by swivel bearings from longitudinal members which are a part of the cross-frame. Braking is electrodynamic and accomplished by using the motors as series generators. Resistance is of the spiral rather than of the grid type, with one set installed under the car and another set placed inside the car to serve as a heater. Transfer from one set to the other is made by a double-throw switch of the spring knife-blade type.

Operation is controlled by two pedals, one of which regulates the electrical energy and the other the brake. After the speed has been reduced to 3 m.p.h. by the control pedal and the dynamic brakes, the stop is completed by exerting pressure on the other pedal, which applies the pneumatic brakes. There are three steps in the electric braking that permit speed control on down grades of approximately 14 or 6 m.p.h. and the final 1½ to 2 m.p.h. The controller pedal operates by steady foot pressure through six notches to full series position, at which point there is a positive stop latch. By slightly raising the foot and then pressing down the operation is carried through the remaining five notches into full parallel position. The foot electric and air brakes, together with the pneumatic hand brake, provide three separate and distinct methods of stopping, insuring positive control of the coach at all times.

All the electro-pneumatic switches, electro-magnetic contactors, motor cutout and sequence switches, sequence and overhead relays, control resistor, terminal board and change-over switch, are mounted in an outside dustproof cabinet under the rear seat. They are so arranged that any piece of apparatus can be inspected, repaired or renewed without disturbing the other apparatus. Wiring is standard cable, the light wiring being No. 14 seven-strand cable with all circuits continuous and not spliced. Ground connections are made on ground wire only, and care was taken to insure complete insulation from every part of the body or frame.

The body of the vehicle is mounted on six wheels, each of the four rear wheels having dual 36x6-in. pneumatic tires. The dual wheels are mounted on two separate axles, each being driven by one of the motors. Rear axles are 54 in. apart from center to center, and the wheelbase of the coach, measured from midway between the rear axles to the center of the front axle, is 225¼ in. The front wheels are equipped with 36x8-in. pneumatic tires. The road clearance is 9 in.

Overhead Construction Specially Designed

Brackets supporting the trolley retrievers are spaced 24 in. apart on the rear of the coach. The trolley poles are 19 ft. long, or 6 ft. 6 in. longer than poles now used on the Salt Lake City street cars giving the coach a possible operating radius of approximately 16 ft. on either side of the center line of the two trolley wires. Coaches operate normally not more than 9 ft. from the center line of the trolley span. The trolley wires are No. 00 round, spaced 24 in., strung at a height of 18 ft. 6 in. above the street and placed with the center line 13 ft. from the curb. Two pairs of wires are so installed throughout the route except on Main Street between Fifth South and Second North, over which section the positive street car trolley wire was left in place and a negative wire installed adjacent thereto to permit joint operation in the business district.

The overhead special work required was designed by Ohio Brass Company engineers, who, mounted on a gasoline-propelled truck, conducted tests with a trolley base, pole, wheel and retriever at proper height and clearance. Experiments were made with several types of frogs, owing to a condition at intersections on Main Street that required a special selective frog permitting right and left-hand and straight ahead street car operation but only straight ahead electric coach operation. A spring tongue frog with a flat spring proved satisfactory,

SUMMARIZED SPECIFICATIONS OF UTAH LIGHT & TRACTION COMPANY TRACKLESS TROLLEYS

Weight and Principal Dimensions

Total weight, approximately	16,000 lb.
Length over all	31 ft. 7¼ in.
Width over all	8 ft. 0 in.
Height, trolley base to pavement	9 ft. 0 in.
Wheelbase	225½ in.
Headroom	77¼ in.
Clearance	9 in.
Door opening, front	36½ in.
Door opening, center	28½ in.
Seat spacing	30 in.
Window post spacing	30 in
Seating capacity	43

Equipment Details

Air compressors	General Electric Type PC
Air governor	Westinghouse Traction Brake Co.
Axles	Eaton Spring & Axle Co.
Body	Duralumin, built by Versare Corp.
Brakes:	
Air	Westinghouse Traction Brake Co.
Dynamic	Westinghouse
Hand	Versare Corp.
Bumpers	C. G. Spring & Bumper Co
Car signal system	Faraday
Control	Westinghouse FL, with dynamic brakes
Destination signs	Hunter
Door mechanism	National Pneumatic Co.
Fare box	Cleveland
Floor covering	Flexolith
Gears	Eaton Spring & Axle Co.
Glass:	
Upper window sash	Amber, McMurty Manufacturing Co.
Other glass	Double strength, grade A
Hand straps	Electric Service Supplies Co., Steelkar
Headlights	Ohio Brass Co. Golden Ray
Heaters	Westinghouse type M
Motors	Westinghouse 1426 A6, 50 hp.
Odometer	Veeder hub type
Rear stop light	Oskel Equipment Co.
Resistance	Spiral
Roof	Agasote
Sash fixtures	Adams-Westlake
Seats	J. G. Brill bus type
Seating material	Spanish grain leather
Steering gear	Ross Gear & Tool Co.
Steps	National Pneumatic treadle
Step treads	Kass
Tires	Firestone pneumatic
Front	36 x 8 in.
Rear	36 x 6 in.
Trolley base, harp, pole and retriever	Ohio Brass Co.
Trolley wheel	Star Brass
Ventilators	Electric Service Supplies Co.
Warning signal	Westinghouse Traction Brake, pneuphonic
Wheels	Van
Windshield wiper	Trico

but owing to the short headway at such intersections the item of spring failures and renewals had to be considered. Another frog with solid runners extending from the frog points to the center and reduced to different thicknesses was tried. The principle of this frog is that the deeper groove of a street car trolley wheel taking a curve prevents the trolley wheel from being affected by the thin runner but causes it to follow the thick runner and take the curve while the electric coach trolley wheel, having a groove of lesser depth, follows the thin runner through.



With nine cross-seats, four longitudinal seats and a wide rear seat the coach can accommodate 43 seated passengers. Automatic doors at the front and center provide for easy entrance and exit



In the residential sections where the trackless trolleys have their own overhead wires they load at the curb

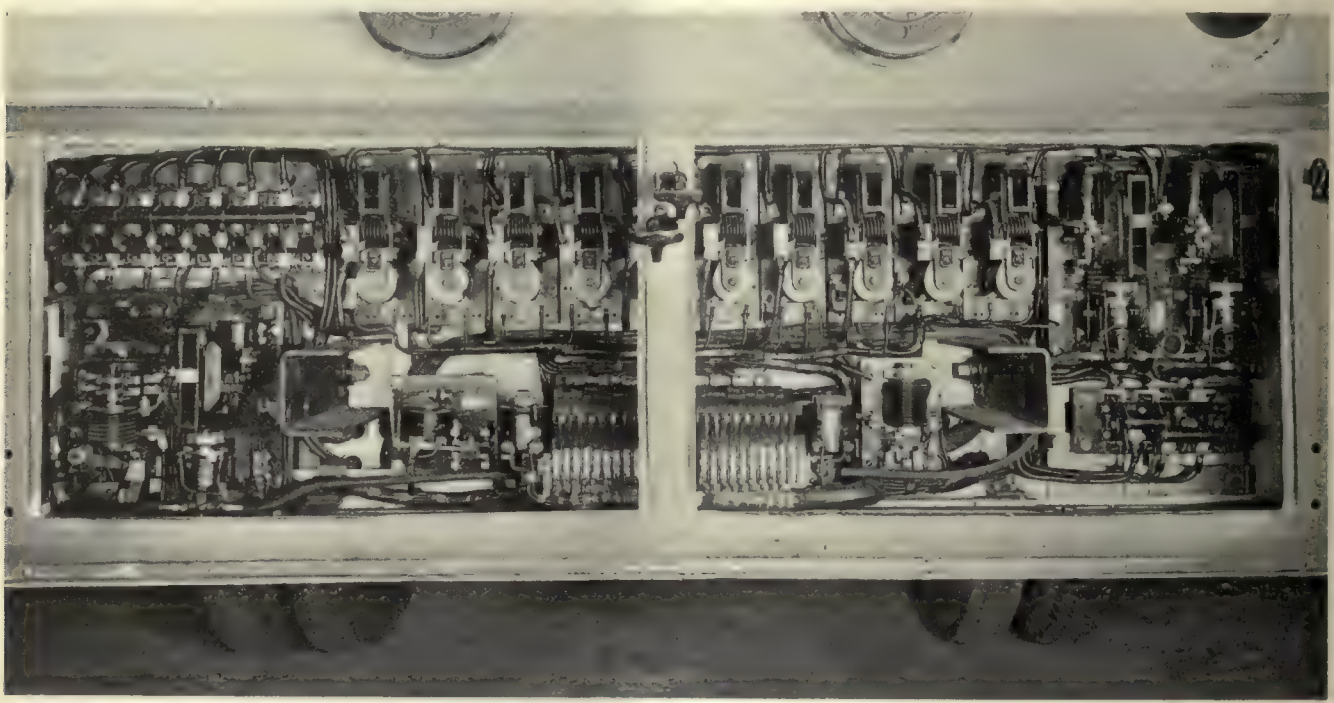
At the wye on this route, however, where the service is less frequent, the overhead employs the spring frog because it more satisfactorily takes care of wyeing cars. Spring frogs may be installed later at Fifth South and Main Street to provide an overhead crossover on the main line, so that coaches will have facilities for getting to the barns at night without the operator shifting the trolley poles by hand from the main-line overhead to that leading to the barn.

The intersection of Fifth South and Main Street affords the greatest variety of switching and crossing devices. At the 15-deg. crossings, for example, initial operation disclosed that the trolley wheel had a tendency to turn in the pan due to the wheel being set in a swivel harp. The first effort to eliminate this difficulty was the use of a small wheel affixed to the harp about 6 in. behind the trolley wheel, to follow and keep it in line. This proved unsatisfactory, however, because when dewirements occurred the overhead was damaged. The arrangement now in use seems to have corrected the trouble. It consists of a mechanical crossing equipped with a pivoting tongue. When the trolley wheel strikes it, this tongue is automatically swung into position. Three of these devices are being used at this intersection, in addition to a set of Cheatham overhead electric switches as well as other crossings and frogs of various angles.

Where street car positives are crossed by electric coach negatives at various angles, especially in the downtown district, it has proved advisable to insulate the positive rather than the negative to give the heavier north and south traffic every advantage to make speed, thereby eliminating the delays that would result from throwing off power for insulators. Coach operation originally began with the negative insulated, but it was found that the "throw-off" necessary at insulators slowed up the coaches. Since this change the coaches can accelerate up to full speed and the necessity for street car operators throwing off power while passing under insulators has been eliminated. On all acute angle crossings, therefore, fiber bridge insulators were used for insulating the street car positive which is passed through a Micarta tube 4 in. long, 1 in. in diameter and of ½ in. bore. This tube is suspended about 1 in. above and across the pan and fiber bridge insulators. The positive, after passing through

the Micarta tube, is held by set screws in the copper castings at the ends of the fiber bridges where the trolley cam tips fit into them. The use of the Micarta insulator eliminates, without sacrificing insulating qualities, a considerable weight that would be present if a hard wood block were used for bypassing the positive.

At right-angle crossings the standard 90-deg. insulated crossover, two live over one dead, as used in Rochester, was installed. This crossover has considerable weight, as it is approximately 5 ft. 8 in. long, and, with the other additional overhead material required, necessitated replacing the $\frac{5}{16}$-in. Siemens-Martin strand span wire with $\frac{7}{16}$-in. wire. Regular $10\frac{1}{2}$x$1\frac{1}{4}$-in. wood strain insulators were used. Prior to the inauguration of electric coach service all trolley and span wires were installed with as much of the special work as possible, so that on the night preceding the changeover to coach operation there would not be more work to do than was absolutely necessary.



This cabinet in the rear of the coach contains switches, contactors, relays and other electrical equipment. It is protected by a massive channel iron bumper

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Six Ways to Obtain

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COMPETITION of the private automobile with its speed and comfort has forced the subject of higher street car speeds to first place among present-day operating problems. While there may be little difference in the total time required to travel between home and place of business by automobile and by street car, the latter, with its more frequent stops, seems slower. In spite of marked improvements in outside and inside appearance, better lighting and ventilation, more comfortable seats and other attractive features the patrons say, "The street car is too slow." Formerly in street car equipment design the major objective was the lowest energy consumption consistent with practical operating requirements. Today the major objectives are higher schedule speeds, quieter running and all-around performance that will enable the street car to meet competition successfully and attract more patronage.

Some operators recognize the need for more speed but dismiss it with the excuse that the street car is slow because of traffic congestion. They say that if the city will improve traffic conditions, street car speed will be satisfactory. Equipment departments of such properties say that the cars are well maintained, the motor capacity is sufficient, and the cars are geared normally for city service, and as a result there isn't much that they can do about it. They argue that the transportation department should reduce the number of stops. Fortunately, progressive equipment men recognize that the line between "can" and "can't" is flexible and by using every effort to improve conditions they can make a material contribution to higher schedule speeds.

Accompanying charts show the effect of changing each of the various factors affecting the schedule speed of the car. Let us consider a car weighing 40,000 lb. complete with passenger load under the following conditions:

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Average voltage	500
Rate of acceleration, m.p.h.p.s	1.25
Rate of braking, m.p.h.p.s	1.25
Wheel diameter, in.	24
Gear ratio	9:1
Number of motors	4
Horsepower per motor	50
Train resistance ,lb. per ton	20

For these conditions of operation this car is much over-motored with four 50-hp. motors. Actually, four 35-hp. motors would be ample for this service. However, it is intended that these 50-hp. motors will be

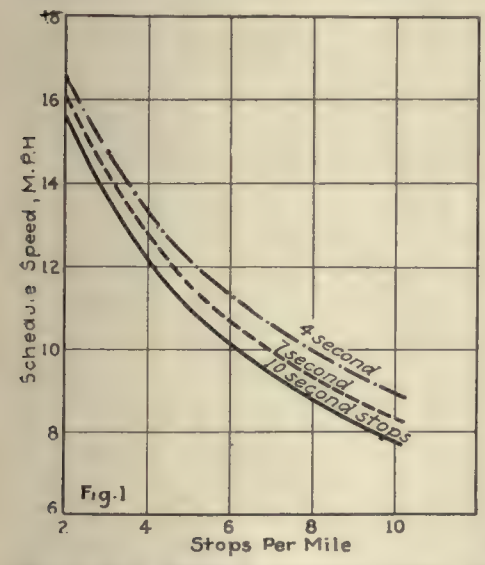


Fig. 1—How changes in duration of stops affect schedule speed

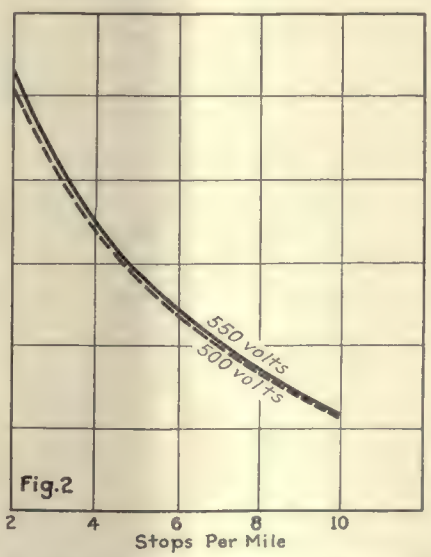


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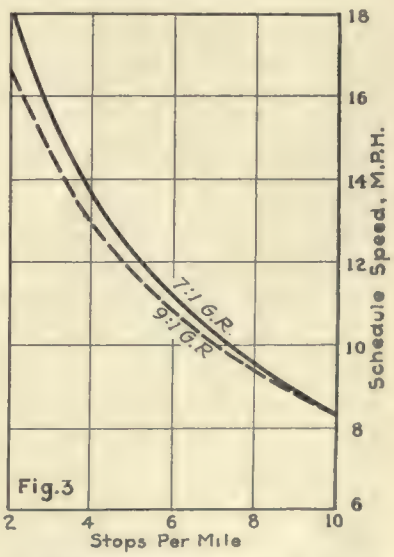
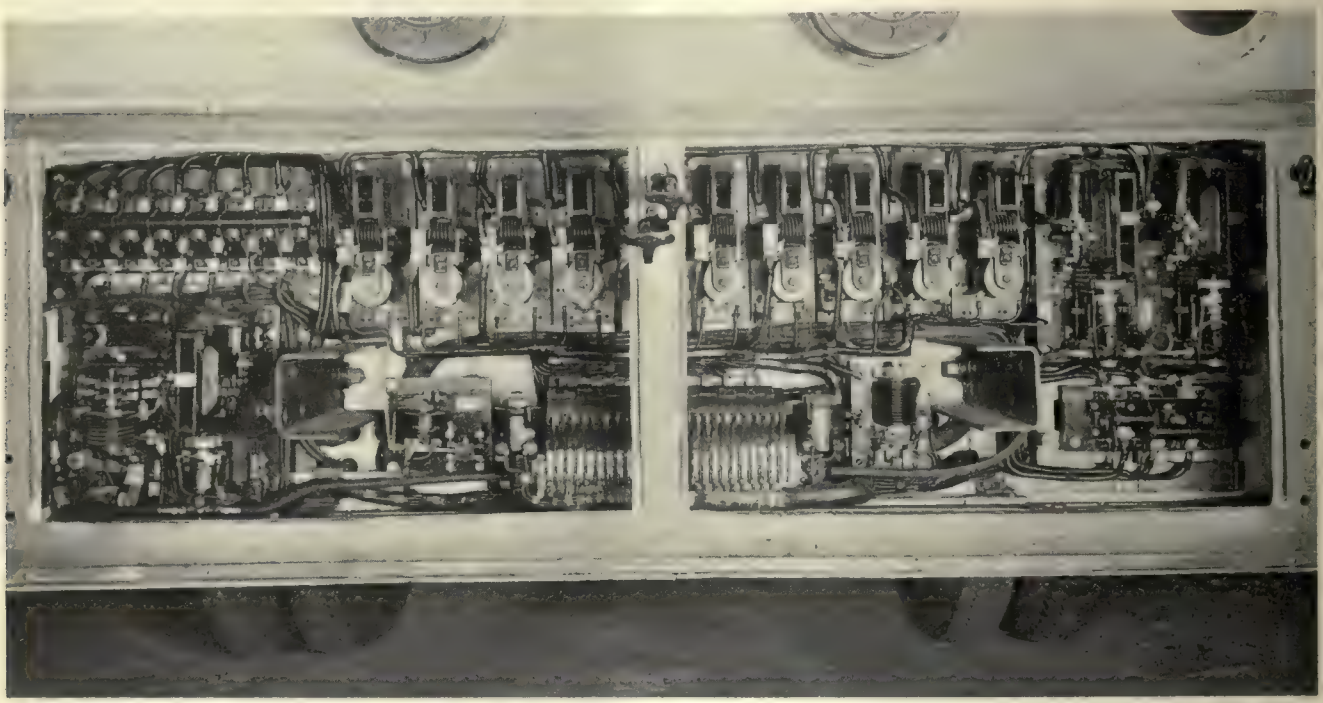


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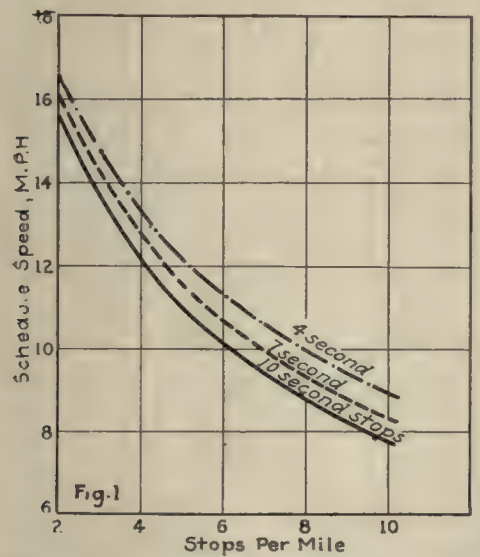


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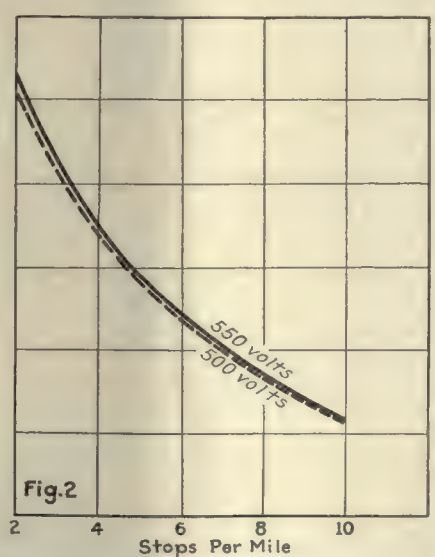


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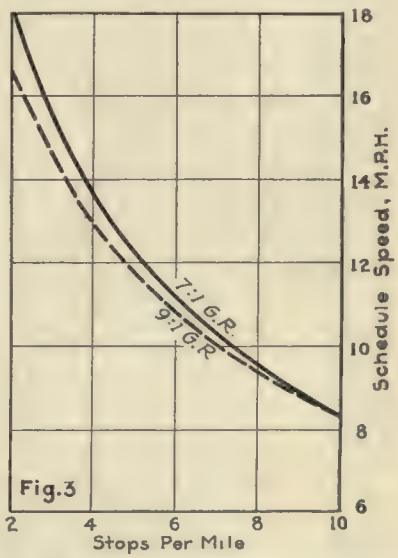


Fig. 3—Effect on schedule speed of changing gear ratio from 9 : 1 to 7 : 1

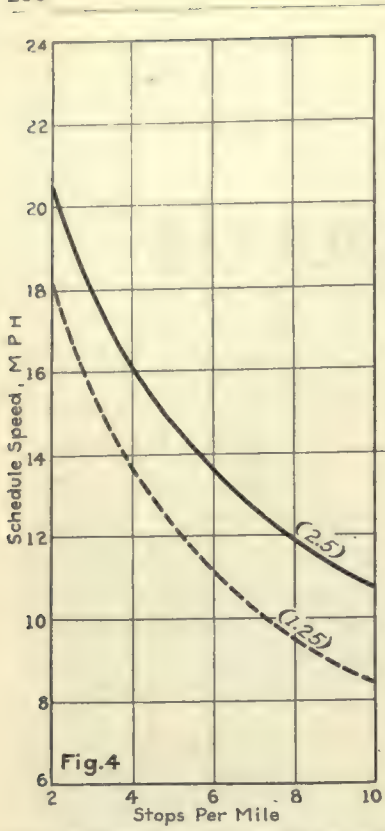


Fig. 4—How schedule speeds are affected by changes in acceleration and braking

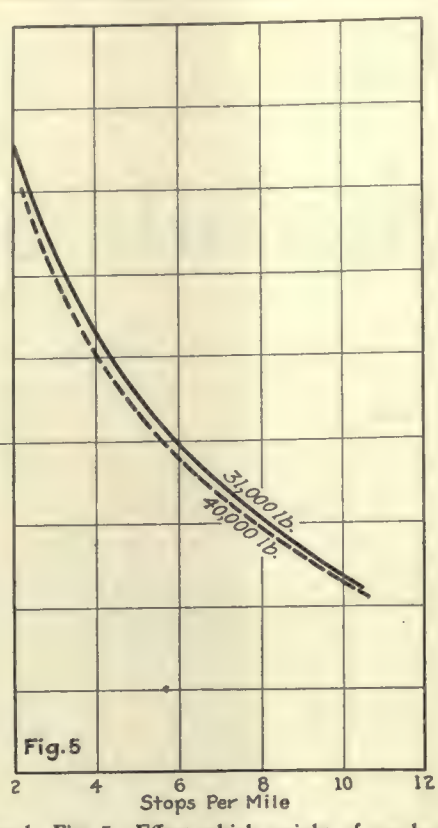


Fig. 5—Effect which weight of car has on schedule speed

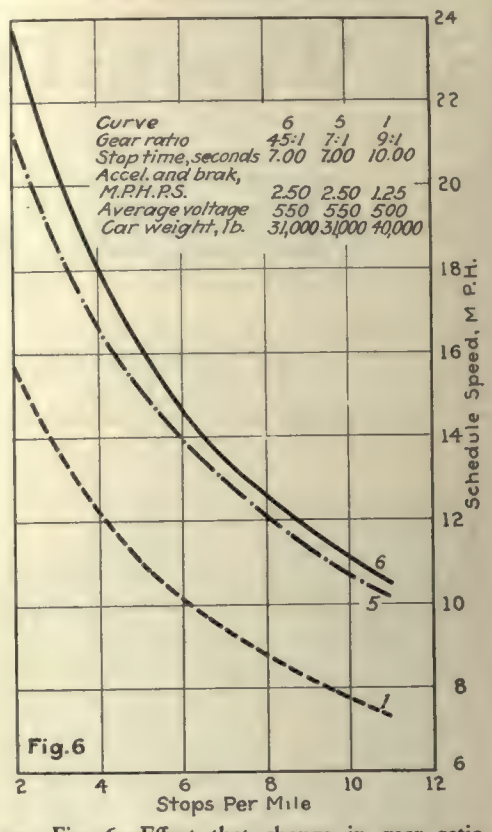


Fig. 6—Effect that change in gear ratio from 7 : 1 to 4.5 : 1 has on schedule speed

worked much harder before this process of increasing schedule speeds is completed and it seems undesirable to introduce into our discussion various sizes of motors with their varied characteristics.

If the number of stops can be reduced, the effect on schedule speeds is quite marked, as will be seen in Fig. 1. For instance, if the stops per mile are now eight and they can be reduced to six the schedule speed can be increased from 8.8 to 10.1 m.p.h. A reduction in the number of stops is one of the most effective means of increasing schedule speeds in frequent stop service and from the equipment man's standpoint one of the the most desirable. In the first place some one else has to take the action. Then the duty to be performed by the electrical equipment is lessened and the energy consumption is reduced. The only trouble is that if the passengers have to walk too far they may not ride at all. This is particularly true in smaller cities.

The next obvious place to increase schedule speeds is in the standstill time. The co-operation of the public and the transportation department is needed here also, but the equipment man has made valuable contributions to shortening stops and doubtless will make others in the future. One need only mention low-floor cars, wide unobstructed doors, door operating mechanism and seating arrangements to facilitate loading and unloading to indicate the large number of improvements made by the equipment department in this respect. Fig. 1 also indicates the changes in schedule speed which can be effected by decreased stopping time. If the round trip length of a line is 10 miles and there are eight stops per mile, the shortening of the average duration of stop from ten seconds to seven seconds saves four minutes on each round trip. Even if the service is not sufficiently frequent so that this reduction may result in saving one car, the effect on the passengers is well worth the effort.

The next place where the equipment man can be of service, although here also he must obtain the co-operation of another department, is in the matter of average voltage. Our original operating characteristic curve was on the basis of 500 volts, which was considered a rather good voltage not long ago. In fact many of the motors were old and any attempt to increase voltage was followed by an epidemic of motor flashing. Now there are few city systems which, except in the congested districts where other considerations may govern, cannot maintain an average voltage of 550. Fig. 2 shows the schedule speeds which can be maintained under the same conditions as Fig. 1, except that the voltage is 550 instead of 500. At seven stops per mile the schedule speed with seven-second stops is increased from 10 to 10.1 m.p.h.

The car on which this study is based has a free running speed on level track of 25.5 m.p.h. at 500 volts. If the gear ratio be changed from 9:1 to 7:1, the balancing speed becomes 32.8 m.p.h. at the new voltage of 550. Fig. 3 shows the performance of the car with the gear ratio of 7:1. The change in schedule speed at ten stops per mile is negligible. At seven stops per mile the change of gear ratio alone accounts for an increase in schedule speed from 10.1 m.p.h. to 10.3 m.p.h.

The next items which are subject to change are accelerating and braking rates. There is no reason why a car cannot be accelerated quickly and retarded slowly, or accelerated slowly and retarded quickly but it doesn't usually work out that way in service. A person becomes accustomed to a certain rate of speed change and in the case of the motorman tends to maintain that rate both accelerating and braking. Years of doing things in the same way have resulted in both rates being too low for present day traffic conditions. The electrical equipments have been improved to a point where much higher rates of acceleration than are generally used are permissible. Air brakes have been improved by shortening the time

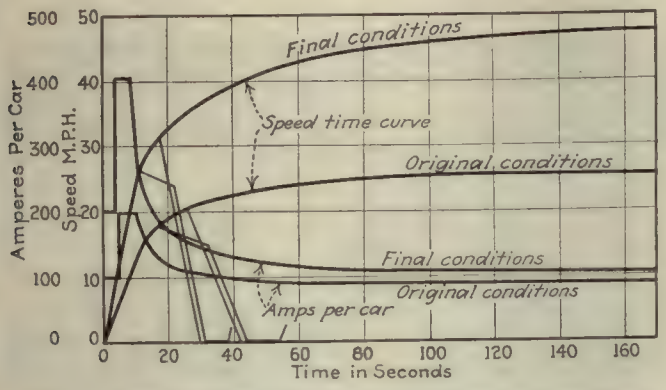


Fig. 7—Speed, current, time graphs for comparing operation under original and changed conditions

elapsing between the application of the air and the building up of pressure in the brake cylinder, and by the variable load feature. There has been a tendency to make tests of accelerating rates and then refer to the higher values observed as those maintained in service. Actually, the averages are much lower. With older equipments, especially two-motor equipments, and in a more leisurely day, 1.25 to 1.5 m.p.h.p.s. were acceptable accelerating rates. Equipment men are now using motors and control equipment capable of accelerating the car smoothly at rates of 3 and even 5 m.p.h.p.s.

There is no reason from the equipment standpoint why average rates of accelerating and braking of 2.5 m.p.h.p.s. cannot be maintained. Some may hold that these rates are a little too high while a few may think they are too low. However, several large railway systems are basing equipment purchases on the maintenance of these rates. The motormen will have to be trained more thoroughly in correct car operation and the public will have to learn that the street car is not going to hold back and let all other traffic crowd ahead of it. More difficult things have been accomplished. Fig. 4 shows the performance of the car with seven-second stops, 550 volts and accelerating and braking rates of 2.5 m.p.h.p.s. At seven stops per mile the schedule speed is now 12.7 m.p.h.

The change of voltage, gear ratio and accelerating rates with increased schedule speed have tended to increase motor heating (hence motor size) and energy consumption. The next change to be considered, weight reduction, compensates for this. Light-weight cars have been the aim of the industry for many years and here also the equipment man has produced good results. The history of weight reduction is so well known that it need not be repeated. Taking recent developments in light-weight cars, the loaded weight of 40,000 lb. can be reduced to 31,000. When the "New Birney" seating 39 and weighing 18,000 lb., is considered the weight chosen seems most conservative. These weight reductions have been brought about while the cars have been made quieter, more pleasing in appearance and more comfortable. Fig. 5 shows the schedule speeds for the 31,000-lb. car. At seven stops per mile the schedule speed is 13 m.p.h.

There is only one more step in this process of increasing schedule speeds and it is contemplated only for certain special conditions. The original car of this study was equipped with 50-hp. motors so that our equipment man could get the most out of it and not be handicapped by inadequate capacity. When he reduced the weight of the car to 31,000 lb. he again found himself with excess motor capacity. To use a part of it the gear ratio is changed to 4.5:1. Fig. 6 shows the schedule speeds on this basis.

EFFECT ON SPEED OF CHANGES IN OPERATING CONDITIONS

	Original conditions	9.5 m.p.h.
Shorter stops	10 to 7-second	10 m.p.h.
Increased voltage	500 to 550	10.1 m.p.h.
Changed gear ratio	9:1 to 7:1	10.3 m.p.h.
More rapid Acceleration and braking, 1.25 to 2.5 m.p.h.p.s.		12.7 m.p.h.
Lighter weight	40,000 to 31,000 lb	13.0 m.p.h.
Changed gear ratio	7:1 to 4.5:1 gear ratio	13.5 m.p.h.

With this gear ratio the car has a balancing speed of 47.4 m.p.h. on level track at 550 volts. That is probably a little faster than most operators care to run a car on city streets. But where there are long grades with few stops the speed of this car is very useful. For example, in Pittsburgh there is a street railway tunnel almost 4,000 ft. long with a 5.8 per cent grade. The original car would run through this tunnel at a speed of 15 m.p.h. at 550 volts. The 31,000-lb. car with motors geared 4.5:1 would operate at a speed of 26.5 m.p.h. at 550 volts, which is a whole lot better. The speed time curves shown in Fig. 7 illustrate the difference between the first condition and the last.

Subways Are Costly, Engineer Advises St. Louis

R. F. KELKER, Jr., Chicago, traffic engineer for the Rapid Transportation Survey Commission at St. Louis, Mo., in an address before the Industrial Club of St. Louis on Jan. 24, advised against too extensive subway construction in whatever rapid transit scheme St. Louis may adopt.

He said that the cost of constructing subways, $9,000,000 a mile, based on New York City's experience, is so prohibitive as almost to restrict subways to streets where no other plan of rapid transit may be utilized. Extensive use of subways is impracticable in cities that do not have a dense population. He said:

> However, if the subway is adopted and proves to be what St. Louis needs, you will have no better sheet anchor for property values than they. But I want to warn you that they are very expensive luxuries. There is not a subway anywhere that pays its own way. New York pays the interest on its subway investments from its tax receipts. The fixed charges on a subway system for St. Louis would exceed the gross annual receipts of the surface street railway system.
>
> St. Louis needs a comprehensive rapid transit program that will give reasonable assurance of being adequate for a long period and yet be flexible enough to permit adjustments as conditions change without changing its basic principles.

Mr. Kelker said that the business of the electric railways is falling off, due to the competition of buses and private automobiles, while costs are mounting. The industry is unusual among public utilities because it is not permitted to assess a service charge on potential users, yet remains the backbone of mass transportation in urban centers, hauling 75 per cent of the population but using only 10 per cent of street space.

Mr. Kelker advocated the co-ordination of the street railway and bus lines to prevent duplication and the "milking" of the revenues of the railways. He added that "the bus has a definite place in the transportation scheme, but so long as you permit one service to take the cream you cripple your major transportation agency."

Stanley Clarke, executive vice-president of the St. Louis Public Service Company, told the meeting that the company would never seek more than a just return on a just investment.



The new Broad Street subway system is co-ordinated with other transit lines of the Philadelphia Rapid Transit Company. The large number of street car lines and buses which connect with the system are shown on this map. The car and bus lines that are numbered or lettered have transfer arrangements with the subway.

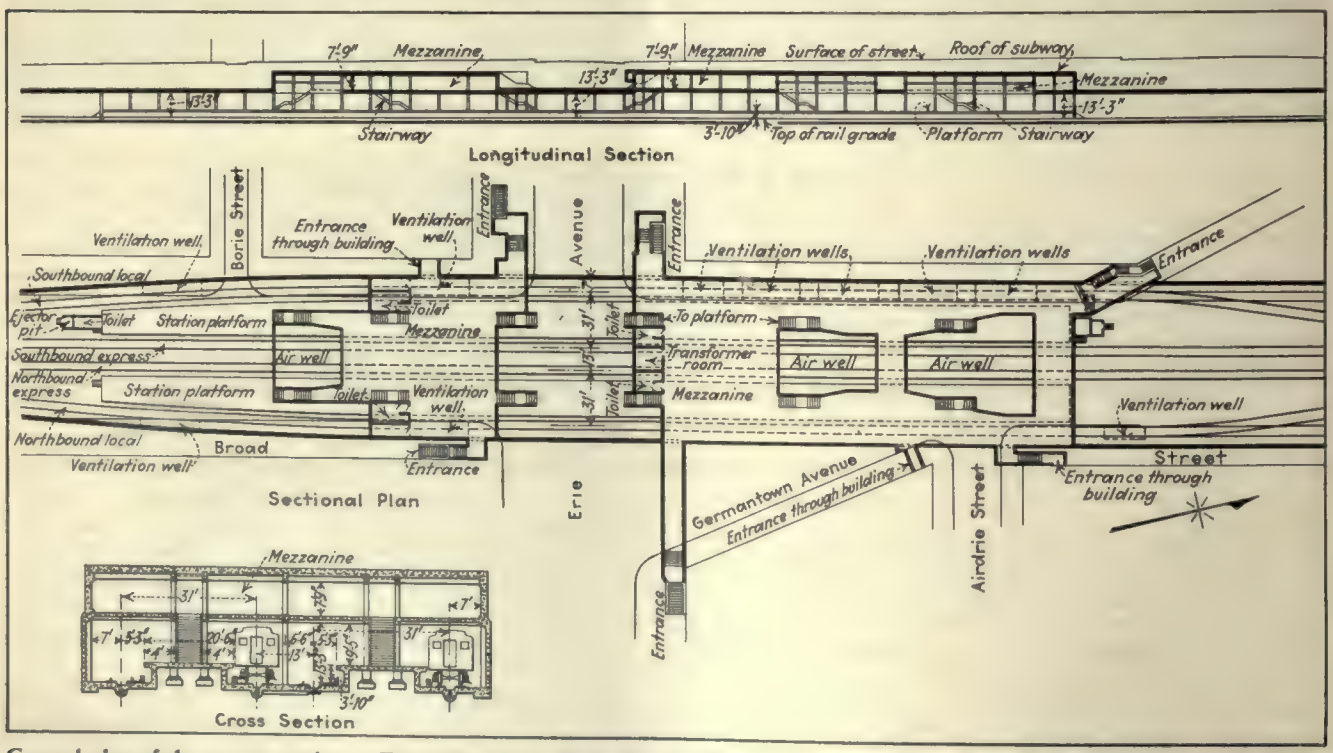
from the Broad Street line to Eighth Street and extending via Walnut Street to Darby through West Philadelphia, the construction of a street car subway on Chestnut Street, later changed to Locust Street, the eventual extension of the Broad Street line to League Island on the south and a subway-elevated to extend into the northwest section of Philadelphia and also over the Delaware River to Camden.

The rapid transit lines are not intended to supplant the street car, nor any other transportation agency now operating. On the contrary, they are planned to fit in as a part of one city-wide transportation system, with the one purpose of serving the entire population in the most satisfactory manner. The policy of the city to have the lines privately operated was formulated primarily to enable complete co-ordination of all the other facilities.

Work was started on the preparation of contract plans for subway construction in January, 1924, it having been determined to concentrate efforts on the portion of the subway in Broad Street. This work involved not only the design and construction of the four-track tube itself, but also the much more complex problem of designing, specifying and providing all of the equipment required to make the subway complete.

On Aug. 25, 1924, ground was broken in Broad Street under the first contract. In March, 1927, the 6½ miles of four-track subway structure from City Hall to the yard, and the yard grading and shop foundations, had been completed, surface restoration work was far advanced and track laying operations were well under way. The next few months saw the completion of the power system, the finishing and equipping of the subway stations, the completion and testing of cars, the provision of shop tools and equipment and the trying out and tuning up of the system as a whole. On April 20, 1928, the first test train was operated in the subway, and on Sept. 1, 1928, the subway was opened to the public between City Hall and Olney Avenue. This made four years from breaking ground to public operation. The cost of this section was approximately $90,000,000, the funds being obtained by the sale of city bonds. The added expense for completing the extension to South Street will bring the total cost to more than $100,000,000.

As the first section of the subway neared completion, plans were made for operating it. Two utilities experts were consulted, J. Rowland Bibbins and Charles C. McChord. Both the McChord and the Bibbins plans contemplated operation by the P.R.T. and the payment to the city of all surplus earnings after the operating expenses were met. Mr. Bibbins proposed that the accounts of the Broad Street subway be kept separate from those of the rest of the transit system, that the P.R.T. be paid an operating fee based on a percentage of the subway's net earnings, and that all surplus revenue over the expense of



General plan of the express station at Erie Avenue. In this station, as in most of the others, mezzanines extend lengthwise to permit underground passage from any point of the subway platform to any of the exits. Another feature is the large number of air wells and smaller ventilating ducts

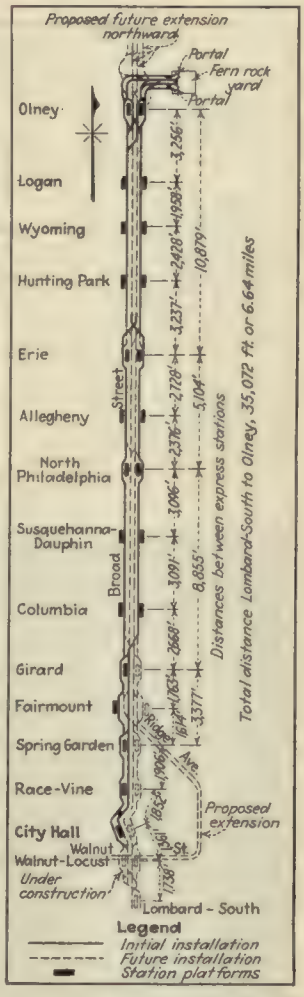
operation and the fee be paid to the city toward meeting the carrying charges on the construction bonds. The McChord report suggested a merging of the accounts of the rapid transit company and the city system, the creation of a joint "buffer" fund and the maintenance of the present dividend rate to P.R.T. shareholders. Both plans called for a board of control over the expenditures and financial operations of the company.

Neither of these plans was thought satisfactory, so the Public Service Commission of Pennsylvania was asked to make a study to enable it to declare the conditions upon which it would approve a lease agreement between the city and the company. Since the study was not completed prior to the time when the subway was ready for operation, a temporary agreement was entered into by the two parties whereby the P.R.T. was to operate the subway for a temporary period of three months, at a rental of $200,000 per month, an amount representing about half of the carrying charges. The agreement provided for the P.R.T.'s receipt of all gross income and required that the company maintain the property in first-class condition. The terms were such that either party could cancel the agreement with a 24-hour notice after the trial period. However, if not cancelled, it was to continue day by day until a permanent lease was formed. At the end of the period on Nov. 30 the P.R.T. notified the city of its desire to cancel the temporary agreement, claiming the operation had caused a loss of $10,000 per day. Negotiations are now under way between the city and the company to formulate an operating lease satisfactory to both parties and retroactive to Nov. 30.

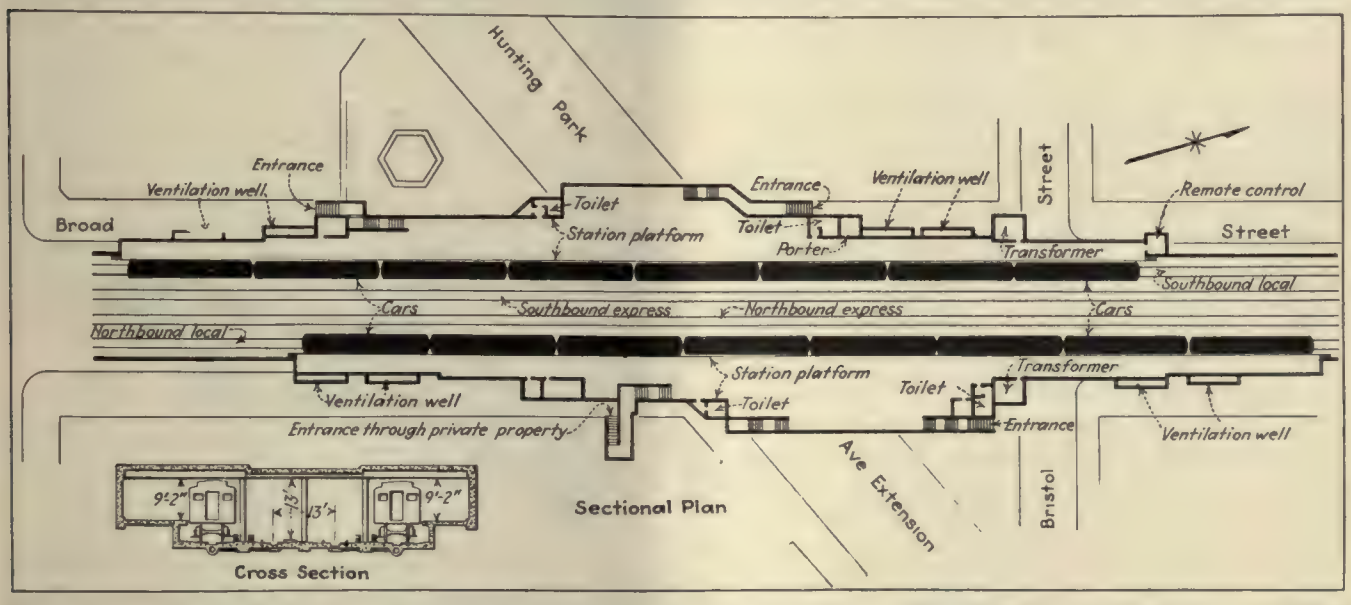
Free Transfers for Several Street Car Lines

The fare being charged on the subway is 7½ cents or two tokens for 15 cents. This is the same rate in effect on the surface lines and the Market-Frankford subway-elevated. This fare, however, permits the passenger to obtain a free transfer to any one of a number of intersecting street car lines or a transfer to any of four bus lines for a payment of 3 cents. There are sixteen car lines on which the transfers can be used, all above Spring Garden Street. Passengers boarding these car lines in the morning obtain transfers to the subway upon payment of the regular fare. There is no transfer or exchange privilege between the Broad Street subway and the Market Street subway because the resultant congestion and confusion, with the Market Street line already heavily loaded at rush hours, would create an unsatisfactory condition.

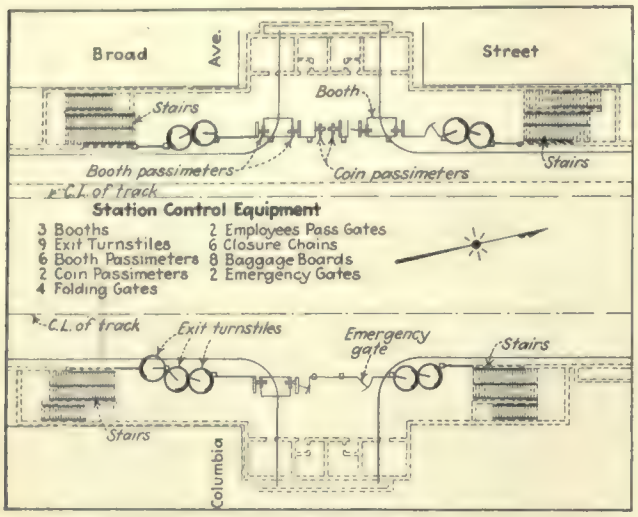
The normal weekday service provides a headway of five minutes during the middle of the day and three and one half minutes during peak hours, morning and evening. During the middle of the day three-car trains are operated, and during peak hours, six-car trains. For the present operation, when City Hall station is used to a somewhat greater extent than it will be after the subway has been extended to South Street, one track has been planked over to supply additional platform space, and operation into the station is now by single track. The running time at present between Olney Avenue and City Hall is 21 minutes, the time of run between the stations varying between one and two minutes. When express service is started, the running time between City Hall and Olney Avenue will be reduced to seventeen minutes. During the early morning hours between 1:30



At the present time only two tracks are being operated the full length of the system, as indicated on the diagram. However, seven of the fourteen stations of the sections being operated are express stations and as soon as traffic warrants the other tracks will be laid permitting express service



The station at Hunting Park Avenue Extension is typical of the other local stations. Although trains at present have a maximum length of six cars it is planned to lengthen them as the traffic increases to eight cars, the number which the platforms were designed to accommodate



Plan of the Columbia Avenue local station, showing the arrangement of the passenger control equipment. Both coin and booth passimeters are used and numerous exit turnstiles and gates are provided

and 5, trains run every eighteen minutes. The scheduled running times between the stations, including stops, are given in an accompanying table.

On Sept. 1, 1928, when the subway was opened to the public, approximately 20,000 people were carried as guests of the city and the P.R.T. On the next day, a Sunday, 62,507 passengers were carried and on the following Saturday 101,110 passengers used the subway. The number reported for the entire first week totaled 564,460. During the first month the system carried 2,519,359 passengers. To carry this number it operated 361,510 car-miles and 27,569 car-hours.

Fourteen Stations on Present System

On the portion of the system now being operated, totalling 6.1 miles in length, there are fourteen stations, seven of which are to be express stops. Only two tracks have been laid for initial operation, but provision has been made for laying two additional tracks when the traffic warrants express service. The tubes with the present track layout contain a total of 20.86 miles of single track, composed of 15.01 miles of revenue track and 5.85 miles of non-revenue track located in the terminal yard and shop. The extension south of City Hall will have two stations and will make the total length of the line approximately 6.64 miles.

The system as now being operated is shown in an accompanying map. As can readily be seen, the two-track arrangement does not allow the use of the northbound platforms of the five stations at the south end of the line. However, with the exception of the Fairmount station, passengers can use the southbound platforms for boarding northbound trains. This was not possible at Fairmount because it is not an express station.

Platforms Accommodate Eight-Car Trains

The average spacing of the stations outside of the delivery district is about ½ mile. The exact distances between the stops, as well as the distances between the future express stops, are shown on one of the accompanying maps. The Walnut, City Hall, Race-Vine, and Spring Garden stations in the delivery district and the Girard, North Philadelphia, Erie and Olney stations to the north, are island-platform or express stations, serving all four tracks. The intervening stations are side-platform or local stations, serving the two outer tracks. Every platform is 550 ft. long and will accommodate an eight-car train. The island platforms, except at City Hall station, have clear widths in the middle section of about 20½ ft., tapering off to between 13½ and 18 ft. near the ends of the platforms. Numerous stairways, averaging about 5 ft. in width, have been provided to facilitate movements between the station platforms and the mezzanines and particularly to reduce movements along the

INTERESTING FACTS AND FIGURES OF THE BROAD STREET SUBWAY

Cost, approximately	$90,000,000
Length of line	6.1 miles
Single track, now constructed	20.86 miles
Number of stations	14
Scheduled running time, Olney Avenue to City Hall	21 minutes
Free transfers to street car lines	16
Three-cent exchanges to bus routes	4
Number of cars	150
Area of yards and shops	34 acres
Construction started	Aug. 25, 1924
Opened to the public	Sept. 1, 1928
Subway excavation	3,131,000 cu.yds.
Concrete poured	373,000 cu.yds.
Structural steel used	47,400 tons

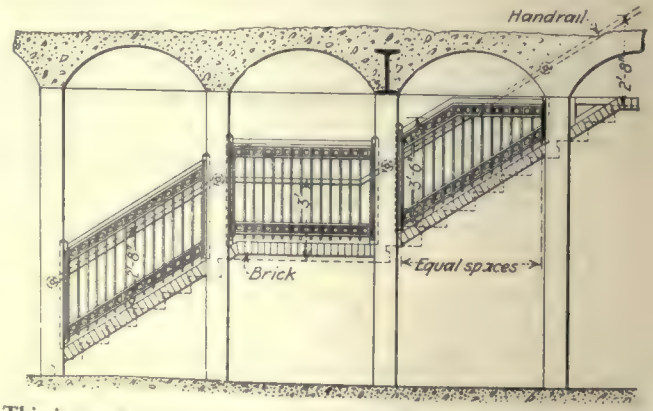
Data of the Subway When Completed to South Street

Cost, approximately	$100,000,000
Length of line	6.64 miles
Number of stations	16

SCHEDULE OF RUNNING TIMES AND OTHER STATION DATA

Station	Entrances at	Color	Distance Between Stations in Feet	Time Between Stations in Min.
*Olney	Olney Ave.	Blue, two tones	3,256	2½
Logan	Lindley Ave., Ruscomb St.	Red and tan	1,958	1½
Wyoming	Wyoming Ave.	Blue, two tones	2,428	1½
Hunting Park	Roosevelt Blvd., Bristol St.	Brown and tan	3,237	2
*Erie	Erie Ave.	Green, two tones	2,728	1½
Allegheny	Allegheny Ave.	Red and tan	2,376	1½
*North Philadelphia	Lehigh Ave., Somerset St.	Blue, two tones	3,096	1½
Dauphin-Susquehanna	Dauphin St., Susquehanna Ave.	Brown and tan	3,091	1½
Columbia	Columbia Ave.	Green, two tones	2,668	1½
*Girard	Girard Ave.	Red and tan	1,763	2
Fairmount	Fairmount Ave., Ridge Ave.	Blue, two tones	1,614	
*Spring Garden	Spring Garden St.	Brown and tan	1,906	1½
*Race-Vine	Race St., Vine St.	Green, two tones	1,852	2
*City Hall	City Hall Square	Red and tan		

* Express stops.



This is not a stairway in a bank building; but the stairway leading from a Broad Street subway platform to a mezzanine level. It illustrates the attractive type of grille work designed for all of the stations

length of the platforms. Liberal mezzanine areas have been provided to allow flexibility of control and freedom in the movement of traffic. At important crosstown streets where the profile is high, bringing the roof of the mezzanine rather close to the surface, the mezzanines are separated into two parts, to allow room for future crossings of utility structures in the intersecting streets. It is possible in most of the express stations to travel from any point on either platform to any exit without going above the surface of the street, because of the arrangement of the mezzanines.

The width of the side platforms varies from a minimum of 10 ft. for short sections near the ends of the platform, to from 30 ft. to 40 ft. in the middle sections. The clear height from the floor to the bottom of roof beams is in general about 8 ft. for mezzanines, passageways and stair entrances, and 9 ft. over the platform areas. Street entrance stairs vary in width and number per station, but in general are not less than 6 ft. wide, are located in the sidewalk against the house line, and are uncovered. In a number of instances, through co-operation of building owners, entrances have been secured through private property, thereby reducing encroachment on sidewalk areas and any resulting congestion of traffic.



One of the more complicated arrangements of track within the system. Under all special work the channel type of track construction is used

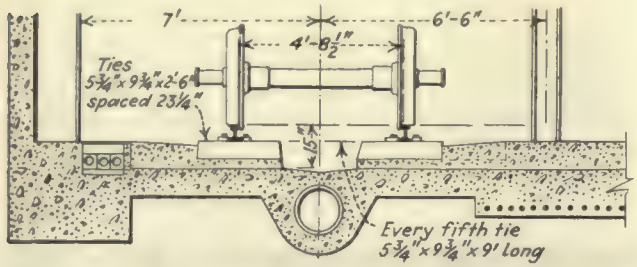
Vari-Colored Tile Used in the Stations

To give a bright and cheerful appearance to the subway stations, the side walls of entrance stair wells, passageways, mezzanines and side-platform stations were finished in white tile, with colored tile borders and station name panels. Four different color schemes were used in the stations, no two successive stations having the same color scheme or design. This feature, intended to help the passenger locate his station, gives a very striking appearance to all of the stations of the system. The four color schemes are red and tan, brown and tan, two tones of blue, and two tones of green. On page 240, three tile designs are shown, and in a table the color scheme for each station is given. The appearance of the stations is enhanced also by the extensive grille work along the stairways and mezzanines, the bricks laid at the edges of the stairways, and the change booths and other station fittings, all designed to give a refined atmosphere to the station interiors.

The stations are well lighted by high intensity lamps mounted in steel enameled reflectors of the standard type or special design as required. The system differs from the usual plan of using five lights in series across the railway voltage of 500 or 600 volts because, except for the emergency lights, a 125-volt alternating current supply is used for this purpose. Particular attention was given to lighting around stairways. Each station has one or two transformer rooms into which the lighting cables and d.c. emergency cable enter. The equipment is in duplicate so that in case of trouble on a transformer or cable feeding the lighting load on the station, it will be automatically transferred to the other transformer. The tunnel lighting halfway to the next station also is supplied from the station transformer. The d.c. emergency lights are arranged five in series across the 630-volt line. The direct current is supplied through a special cable which loops into each substation, so that in case of failure of any one substation current for the emergency lights can be supplied from either one of the other stations. The emergency lights form part of the general lighting system and are burning at all times. They are placed at all stairways and stations along the platforms and mezzanine floors in sufficient number to permit passengers to find their way through the station in case of failure of the general lighting system.

An important part of the station equipment is that provided for the entrance and exit of passengers. Perey passimeters of the coin and booth control type are used throughout the system. In some stations only the booth type are used, but in the larger ones several coin passi-

meters have been installed. In the stations on the upper part of the route more passimeters are installed in the southbound side, and more exits are provided on the northbound side to accommodate the great number of passengers who enter the station in the morning and leave it at night during the rush periods. The change booths are of both the single-end and double-end type, and in certain stations several are provided. In addition to the



The solid type of concrete track structure rather than the more usual ballasted type was selected because of its many advantages. On tangent track the ties are partially embedded in concrete as shown above

numerous exit turnstiles, the stations have emergency gates and separate gates for the employees. The station control equipment of a typical station is shown in one of the illustrations.

Connections Made with Railroad Stations

A passageway 12 ft. 6 in. wide, built on the subway roof, connects the north mezzanine of the North Philadelphia station with a passageway built by the Pennsylvania Railroad, leading directly to its North Philadelphia station. A like passageway has been built to connect the south mezzanine of this same subway station with the Huntingdon Street station of the Reading Company. The Reading Company has planned the construction of a new four-track railroad station at this point.

A similarly constructed 14-ft. passageway connects the Race Street mezzanine and intermediate subway entrances with mezzanine areas at Filbert Street, which in turn give a new and direct access to the City Hall station of the Broad Street subway, the proposed Pennsylvania Railroad underground electrical suburban station, the authorized Filbert Street subway station, etc.

City Hall Station and Pedestrian Concourse a Big Project

Early in 1924 a proposal for an extensive system of underground concourses in the center of the city was made. The plan provided for a concourse completely encircling City Hall and extending in Broad Street beyond Chestnut Street on the south and Arch Street on the north, forming a direct underground connection between all of the existing and proposed subway and railway stations in the general vicinity of City Hall, with entrances and exits to or convenient to large office buildings, department stores, etc. Such a concourse would aid materially in spreading and distributing underground traffic to and from the various existing and proposed stations in this section, thereby relieving the surface of a large portion of this traffic, and also would improve materially the accessibility of the City Hall station of the Broad Street subway.

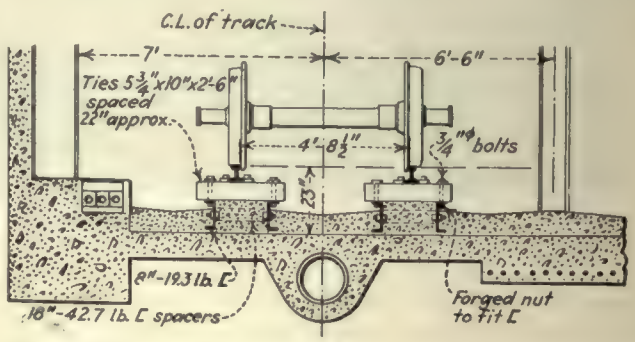
In designing the subway provisions were made to extend the system as needed or to give better service on the system as the traffic increased. Alignment, profile, stations, track arrangement, and terminal facilities all were designed with this in mind. For example, the main line was made to accommodate four tracks, even though express service will not be warranted for some time. Also, at the northern terminus of the line extra track spaces were provided to a little beyond Grange Avenue for the extension of either or both pairs of tracks northward at any time without disturbance of the existing structure or of the operation of trains therein, and, of course, without any grade crossing movement. This involved extensive construction and cost, but will result in a big saving should the extension to the north be made.

Just north of the Erie Avenue station, where the subway drops to pass under the Reading Company's tracks, advantage was taken of the situation to provide a two-level structure, whereby local trains can be turned back without grade crossing movements. This provision will enable a balancing of service and traffic and added flexibility of operation. If the Ridge Avenue extension is constructed, no doubt this will be used for turning back the trains. As designed, the ramp will accommodate a total of 32 cars. Trains northbound can leave the outer main line track, run up on the ramp and return on the outer southbound track without crossing the express tracks at grade.

The two-track branch to Ridge Avenue has been provided for by a special six-track, two-level construction, enabling either express or local trains to be diverted into Ridge Avenue, and with a complete separation of grades.

Profile and Sectional Details of the Structure

The distance from City Hall to Olney Avenue is a little more than 6 miles, and in this distance there is a total rise in elevation of top of rail of 167½ ft. The



The channel type of track construction, with the ties bolted to channels, which in turn are embedded in a concrete track floor, was used under switches, frogs and other special work

maximum main line grade is 3 per cent and the minimum center line radius on the main track is 200 ft. The maximum grade of the track in station areas is three-tenths of 1 per cent. The profile was kept as near the surface as conditions would permit to save cost and to add to public convenience.

Broad Street is 69 ft. between curbs and 113 ft. between house lines. The over-all width of the four-track structure is 57 ft. at standard sections, widening out to 113 ft. at and near stations. The structure has a concrete invert, steel columns and roof beams spaced 5 ft. 6 in., with concrete jack arches forming the side walls and roof. The standard vertical clearance over the top of rail is 13 ft. and normal spacing of track centers 13 ft. Subway



Excavating in one of the rock cuts. Note the heavy bracing to hold the side walls and to support the decking for the street

clearances have been provided on the basis of cars 67½ ft. long, 10 ft. wide and 12 ft. 3 in. high. Waterproofing, in general, has been restricted to the roof, where two ½-in. layers of asphalt mastic form a membrane protected by a 3-in. coating of lean concrete. Lateral drains are provided at frequent intervals to reduce accumulation of water along the subway walls, and longitudinal drains under the track carry all water to float-controlled electrically operated pumps installed at the five low points on the line. A duct bench along the outer wall forms a walk and, together with the extra clearance afforded by the side wall arches, offers a safety zone for trackmen and others working in the tube during operation.

In designing the ventilation system it was determined to rely upon natural ventilation, aided by the piston action of the trains, through sidewalk gradings of ample capacity, and in the deeper sections of the subway near City Hall to provide fan chambers so that, if in later years it becomes necessary, the natural ventilation can be supplemented by mechanical ventilation.

Ventilation wells are provided of reinforced concrete construction, connecting openings in the side wall of the subway with sidewalk grating located at the curb. The grating units are 4 ft. wide and 5 ft. long, arranged in banks of from three to six units, distributed as uniformly as underground and surface conditions would permit, and to the extent practicable with openings at all summits and valleys. The grating area provided is in proportion to the air content of the subway structure, which varies from about 740 cu.ft. per foot of length between stations, to about 1,030 cu.ft. at local stations and to about 1,250 cu.ft. at express stations. At and near



In part of the excavation work trucks drove down ramps into the subway where they were loaded by air shovels

station areas, one square foot of net ventilation area was provided for every 750 cu.ft. of subway content. This is in addition to the entrance stair openings. Between stations, the design was based on a ratio of 1 sq.ft. net area per 1,000 cu.ft. of subway content. Between City Hall and Grange Avenue at the north, there is an average of sixteen units in each side per square.

Ventilation openings at station platforms are screened and fitted with louvers to prevent snow, dirt, etc., from blowing through. On either side of the subway and about half way between all stations, a modified ventilation well is equipped with stairs and a counter-balanced grating at the sidewalk to serve as an exit from the track level for passengers or as an exit for rescue forces in case of emergency. The exits are indicated in the subway by lighted signs connected with the subway lighting system, which is fed from duplicate circuits with automatic throwover devices to guard against failure of one circuit. A fire alarm and telephone also are located at each emergency exit, the telephones being indicated by purple lamps.

Solid Concrete Track Construction Adopted

In selecting the type of track structure for the subway, the major characteristics sought were safety of operation, permanence of alignment and surface, long life of the



One of the contractors raised the excavated material through shafts and loaded the trucks on the street surface

structure to keep to a minimum the frequency of and average cost of maintenance and renewals, and a construction that would facilitate keeping the subway floor in a clean and sanitary condition. It was determined that a solid concrete track, rather than the more usual ballasted type, best met these requirements. The type selected for tangent track, and this covers the major portion of the subway track, consists of ties partially embedded in concrete, as shown in one of the accompanying illustrations. This type would not be advantageous for use under special work because of the greater wear and strain imposed on the track in such location, with the resulting necessity for comparatively frequent adjustment and renewals of portions of the structure. It was considered desirable, therefore, to obtain a more positive anchorage of the track to its foundation and to so arrange the track elements that they could be adjusted or replaced at lesser cost and with less interference with the operation of the trains. In the type selected for this purpose, the ties are bolted to channels, which in turn are embedded in a concrete track floor, as illustrated.

The ties, of Southern yellow pine, were creosoted with

5 lb. of oil per cubic foot by the empty cell process, after being dressed and bored for screw spikes and tie bolts. They were cut from 6x10-in. timber and surfaced to a uniform thickness of 5¾ in. In the straight track type of construction, the ends of the ties were beveled to form an anchorage to the floor. Short ties, 30 in. long, are used under each rail and spaced 23¼ in. between centers with every fifth tie 9 ft. long to engage both running rails and to provide for the conductor rail. In the channel type short ties are used throughout except where switches, frogs, etc., require the use of greater lengths.

The rails used in the subway are 100 lb. A.S.C.E. section, 62 ft. in length. This particular section was selected largely because of its wide base as compared with the weight of the rail. This wide base, in conjunction with ties having a 10-in. face, gives sufficient tie bearing to justify the omission of tie plates. Screw spikes with cast iron clips to engage the base of the rail are used throughout the subway and splice bars of a type recently developed and embodying the so-called "head-free" feature are used.

The special track work, involving switches, frogs, crossings and curved rail, is of rugged construction. Cast manganese steel is used at practically all points of maximum wear and most of the switches in the subway are of a specially designed type. All curves of short radius are protected with guard rails, and guard rails also have been installed at all other locations where a tendency toward derailment might exist. The running rail in all special work is the same as that used on straight track.

A pipe line for compressed air extends the full length of the subway with taps at frequent intervals for connecting to electro-pneumatic interlocking and train stops.

The work of subway construction, including grading and foundation work in the terminal yard, was divided into four large sections. These sections varied in length from 7,184 ft. to 10,131 ft., and involved costs varying from $12,300,000 to $17,700,000. Three of the sections included three stations each while the fourth included four stations.

The construction requirements specified varied from complete decking of the trench and maintenance of the full street for traffic to open-cut construction, depending upon the local conditions. The temporary and permanent relocation of gas mains to keep gas out of the trench was provided for under separate contracts. Extensive relocation of large water mains to safeguard service as well as construction operations, and reconstruction of four large sewers crossing Broad Street, as well as the support, maintenance and protection of public utility structures, buildings, etc., along the line of the work, were included in the general contracts, as were the temporary paving and the restoration of sidewalks.

The following figures will give an indication of the magnitude of the work between City Hall and the terminal yard:

Subway excavation	3,131,000 cu.yd.
Concrete	373,000 cu.yd.
Structural steel	47,400 tons

One of the two contractors who constructed the subway used the cross-bracing and posting method of timbering, decking the entire width of the cut. The excavation work was carried on by hand tools and the spoil carried by an industrial railway to fifteen shafts, located about 600 ft. apart, and there hoisted to the surface and loaded into trucks. The other contractor first opened and covered one-half the street, supporting the decking on large I beams spanning the trench, and bracing the sides of the excavation from the I beams.

The preparation of plans and specifications, the receipt of bids, the awarding of contracts and the supervision of construction for the Broad Street Subway and the other transit projects now under way by the city are taken care of by the Department of City Transit. The present personnel of this department, most of whom assisted in the design and construction of the subway, include C. E. Myers, director; George T. Atkinson, assistant director; Frank R. Fisher, chief engineer; Charles H. Stevens, engineer of design; H. M. Van Gelder, electrical engineer; George B. Taylor, consulting engineer, and S. M. Purdy, construction engineer.



A total of 150 cars of the type shown above were ordered for the initial operation. They were especially designed for underground rapid transit service

Tide Water Safety Record Wins Another Brady Medal

FOR the second time in two years the Tide Water Power Company of Wilmington, N. C., has won the Brady Safety Award for companies operating less than 1,000,000 vehicle-miles. In its last Brady brief, the company points out that greater interest has been taken in good service and safety by both the company's employees and the public in Wilmington since the company's receipt of the Brady medal for its 1926 operations. There have been numerous evidences that the public continues to appreciate the company's efforts along the lines of safety and sanitation. One proof of this is that in practically all cases in the city requiring resuscitation, calls are put in for the employees of the company to take charge. City and county school authorities have also shown an increased interest in allowing the company to present safety messages to all of the school children in the territory in which the company operates.

A map has been prepared and hung in the trainmen's room, showing where accidents have occurred. In monthly talks given to the men in this room, the map is used and the circumstances surrounding various accidents are recalled, with a view of avoiding recurrence of similar types.

With the co-operation of the city authorities, improved parking conditions have been obtained along the routes of the car line in congested districts. A faster movement of cars and a reduction of accidents at these points have followed.

An employees' school, started in 1926 and meeting twice each month was continued and expanded during 1927. Instructors were paid 50 per cent by the federal government, 25 per cent by the State, and 25 per cent by the company. The meetings were held on the employees' time, an hour being devoted to actual classroom work with instruction in elementary and technical subjects. A later hour or more was devoted to safety talks and moving pictures.

In addition, monthly safety meetings are held throughout the year. Recently they have taken largely the form of experience meetings, in which employees are requested to report once a month any unsafe conditions they have discovered and remedied through the usual channels since the previous meeting.

The bonus plan in operation for trainmen and bus drivers is being continued, and last year one-half of the 48 operators had perfect safety records. Under the plan an operator can win an annual bonus of $21 by a non-accident record.

The company gives transportation on its city lines to district nurses in consideration of free service to company employees and their families in case of sickness.

The success of the safety program is shown by the results. For a period of more than three years there has not been a single fatality on the property, and the number of persons injured has shown a gradual decline from 32 in 1924 to 12 in 1927. The total cost of accidents, claim department operation and miscellaneous claim expense during 1927 was only 1.1 per cent of gross earnings. The average cost per accident was $58.16, or $0.0029 per vehicle-mile. The number of accidents per 100,000 vehicle-mileage was 4.94, or 20,250 vehicle-miles per accident.

Line Car for Lima Toledo Railroad

SEVERAL features not regularly found in line cars are incorporated in a new one built for the Lima Toledo Railroad. It has an open platform at one end with provisions for a reel of wire, and an inclosed section 37 ft. long. The underframe has four 6-in. I-beams and two wood sills. The two center sills and the two outside sills are of steel I-beams and the two intermediate ones are long-leaf yellow pine. The length of the flat end is



New line car of Lima-Toledo Railroad

8 ft. 4½ in. Inside the inclosed body at each end is the motorman's inclosed cab, 45x48 in. In this is the various controller and air brake operating equipment. The inside of the car is provided with bins of different sizes to take care of material carried, and there is also a work bench with a vise attached. The car has three large lockers for raincoats and hats. It is also equipped with stove for heating and cooking, and in addition to this there is an electric heater in each motorman's cab.

The tower is 7 ft. 1 in. x 7 ft. 6½ in., and has a raise of 4 ft. It is operated by an air cylinder which consists of a brass pipe of 8 in. inside diameter and 4 ft. 6 in. long. The top of the car at each end of the tower is equipped with a flat deck, so that when the tower is down there is a working platform 7 ft. 6½ in. wide by 35 ft. long.

At each end there is a Crouse-Hinds Z.P. dash headlight mounted so that the motorman can raise and lower it vertically and swing it to either side of the track from his seat in the cab. This makes it possible to focus the light on the pole line for trouble shooting at night.

Constructing Tracks on Clay Subsoil



Stone and stone dust were used for the base of this track, laid on clay subsoil. Note the buckled pavement which was laid directly on the clay

HEAVING of tracks constructed on clay subsoil was prevented by the Montreal Tramways, Montreal, Que., Canada, by using alternate layers of stone and stonedust for the base. The clay was excavated to a depth of 18 in. below the ties and a 6-in. layer of stonedust laid on the subgrade. On this was placed about 4 in. of 1-in. stone, another layer of stonedust, 2 in. thick, 5 in. of 1-in. stone, and 1 in. of stone screenings for tamping to surface.

The concrete paving base for the roadway and the railway track were laid late in the fall of 1927, too late for the city to lay the asphalt surface. During the winter the concrete base on the roadway, which was laid directly in the clay, heaved approximately 7 in., as may be seen in the illustration. The electric railway tracks, with their stone base, were not affected.

Extension of Freight Pick-up and Delivery Service Recommended

CONCLUDING a careful investigation which extended over a period of two years, the committee on the pick-up and delivery of freight of the Central Electric Railway Association has presented a report recommending that all member companies concurrently seek to develop this kind of business, both locally and interline.

Although the population and the business of the country have increased, the steam railway and electric railway freight earnings have remained stationary since 1925. In 1918 steam railway freight earnings in the United States were about $3,522,000,000. By 1925 this had increased to $4,648,000,000. Electric railway freight earnings in 1918 were $13,637,000 and had increased in 1925 to $24,085,000. Since that time neither steam nor electric freight earnings have shown any appreciable increase. In 1917 there were but 326,000 trucks registered, while in 1926 the number registered had increased to 2,766,222, an increase of 750 per cent. With business conditions thriving in this country the total freight business of all carriers must be increasing, but the electric railways and the steam railroads are not enjoying the benefits of this increase. The committee believes that most of the increase which might normally have been expected is being taken care of by motor trucks.

While in most instances the gross freight receipts have not actually decreased, the electric lines have lost much of their profitable short-haul business to the trucks. This situation is unsatisfactory because through rates are not so high in proportion to the length of haul, consequently the business is less profitable. The electric roads now carry iron pipe, large castings, machinery and other bulky and cumbersome merchandise, which is expensive to handle and on which rates are low, while the trucks are transporting the high class and easily handled freight. The principal reason why the trucks are getting this business is because they give store-door pick-up and delivery service at the same or lower rates than the railway lines offer.

The present-day merchant does business with small inventories. He demands speed and insists that the carrier perform the entire service of pick-up, handling, transportation and delivery with as little effort as possible on the part of the consigner or consignee. The electric roads must prepare to meet these requirements and complete the transaction from start to finish. If they do not do it, the report states, the steam roads or the motor trucks will. The electric railways are further handicapped by a lack of commercial tracks into industrial and wholesale establishments, the advantage in this respect going to the steam railroads. Further competition from steam roads is anticipated when these roads provide a system of freight containers.

The report of the committee does not make any specific recommendation as to how the requisite pick-up and delivery service should be performed, beyond indicating that it may be done with trap or ferry cars, trucks, trailers, or otherwise. A tentative tariff, similar to those now in effect on some of the steam roads serving the territory, is submitted with the suggestion that it be amended where necessary to fit local conditions.

Southern Equipment Men Discuss Maintenance Problems

Methods of increasing schedule speed, economy of gas-electric drive, and bus rebuilding evoke interest at Houston meeting

NEW cars, improved car equipment and maintenance and construction of buses were the chief topics of discussion at the joint meeting of the Electric Railway Association of Equipment Men, Southern Properties, and the Mechanical Division of the Southwestern Public Service Association held at Houston, Tex., Jan. 23-25. A review of outstanding equipment seen at the American Electric Railway Association's convention held in Cleveland last September was given by W. H. McAloney, superintendent of equipment Georgia Power Company. He referred particularly to the two types of four-wheel car that were shown there. Regarding trends in design, he said that there was an increase in motor capacity, a general tendency to use roller bearings where possible, to use metal sash, some type of floor covering and improved seat upholstering.

A paper describing means of securing an increase in scheduled speed was presented by G. M. Woods of the Westinghouse Electric & Manufacturing Company. An abstract appears elsewhere in this issue. The experimental type of foot control equipment now being tried by the Pittsburgh Railways was described by E. H. Bell, equipment engineer for that company. The idea behind the development of this type of control equipment is to relieve operators of one-man cars of some of the duties which it is now necessary to perform by hand. Cars having this equipment were described in the June 2, 1928, issue of ELECTRIC RAILWAY JOURNAL. Outstanding features of the new Birney car were outlined by F. J. Bennett, master mechanic, Houston Electric Company. This car was described in the issues of ELECTRIC RAILWAY JOURNAL for Oct. 20, 1928, and Jan. 19, 1929.

Maintenance of cars from a transportation viewpoint was discussed by P. S. Duenweg, general superintendent Houston Electric Company. He referred somewhat regretfully to the fact that ideas for the new designs now being considered by operating properties had come from outside the electric railway industry. To be successful, a car must combine two features: First, it must have such strong riding appeal that the patrons will not ride it out of curiosity and then leave it and go back to their former method of transportation, and, second, it must be so designed that sufficient saving in maintenance and operating costs can be effected as to make it possible to pay for these cars in a short period of years.

BUS MAINTENANCE NOW AN IMPORTANT PROBLEM

The economy of the electric drive for buses was emphasized in a paper given by Guy W. Wilson, General Electric Company. Under comparable conditions he estimated that the gasoline-electric drive bus would cost 1.03 cents less per vehicle-mile than a mechanical drive of the same type, assuming the proper application of the former. As a demonstration of reliability he pointed to the record made by 580 gasoline-electric buses that had run 16,800,000 miles with an average of 86,000 miles per transmission failure.

Costs for complete rebuilding of buses were presented by George Hoskins, master mechanic Northern Texas Traction Company, Fort Worth. On a group of eight buses, all of the four-cylinder type, the total cost for rebuilding averaged $2,130 per vehicle. Of this sum $1,300 went for body overhaul, $140 for painting, and the remaining $690 for engine and chassis work. All these buses were several years old and in bad condition. Mr. Hoskins explained the large item for body work by saying that, while the panels and trimmings were salvaged, the ash posts and frames had rotted out so completely that all of them had to be replaced. White oak was used because it had worked well on electric cars, although the weight was thereby increased some 550 lb. per vehicle. In the effort to prevent further dry rot, all inclosed woodwork was painted with a lead and oil primer. Roofs which had been damaged because of the baggage rack were strengthened by the use of bent oak carlins instead of the sawed type previously installed, and by replacing the slats with a solid roof of ¼-in. poplar.

On the basis of this experience Mr. Hoskins held that complete rebuilding was good economy when the body was of standard type and the engine and chassis were not obsolete. His statements about the short life of ash framing were concurred in by other members, all connected with properties in the Southern states where unusual conditions of humidity exist. A few favored the metal body when properly primed to prevent rust, although the wisdom of assuming a ten-year life for such construction was questioned on the ground that new equipment would be needed to keep the riders.

Other details of construction which received attention in the rebuilding were the brakes, windshields and exhaust system. Two members reported the installation of brake-drum lathes, and one told of finding it necessary to true up the drums on new buses. Answering the question as to the best windshield wiper for buses, the meeting agreed that none now on the market was entirely satisfactory. J. H. Stakes, Twin Coach Corporation, responding to an invitation, described methods of keeping gas fumes out of bus bodies. His main recommendation was that engines should be washed once a week. In addition the carburetion should be watched, manifolds and pipes kept tight and mufflers and tail pipes free from obstruction. Mr. Stakes warned against heating of springs or front axles for re-arching or straightening purposes.

Cleaning of miscellaneous parts and the reclaiming of oil were taken up in connection with the second day's program, when a list of 55 questions submitted by members before the meeting were discussed at length. Several members told of their success with various types of commercial oil reclaiming devices. H. E. Gohlman, Texas Company, offered to provide blueprints of a simple device for filtering used oil. This makes use of a washing powder and can be built at small expense. He warned against attempts to reclaim mixtures of different grades of lubricating oils. Gas-steam systems of cleaning cars were discussed, the verdict being that they were still in the experimental stage and that their value depended to a great extent on the type of washing compound used.

Officers of the association for the current year were elected as follows: President, A. Taurman, Birmingham; vice-president, W. H. McAloney, Atlanta; secretary, L. O. Eiffert, Birmingham. Members of executive committee, John Brown, Dallas; Frank Wampler, Covington; W. H. Curtis, Little Rock; R. S. Bull, Pittsburgh, and J. M. Kington, Knoxville. It was decided to hold the next meeting of the association at Lexington, Ky., July 24-26.

New Offerings of

USEFUL EQUIPMENT

Silico-Manganese Steel for Special Trackwork

By George A. Richardson
Manager Technical Publicity Department
Bethlehem Steel Company

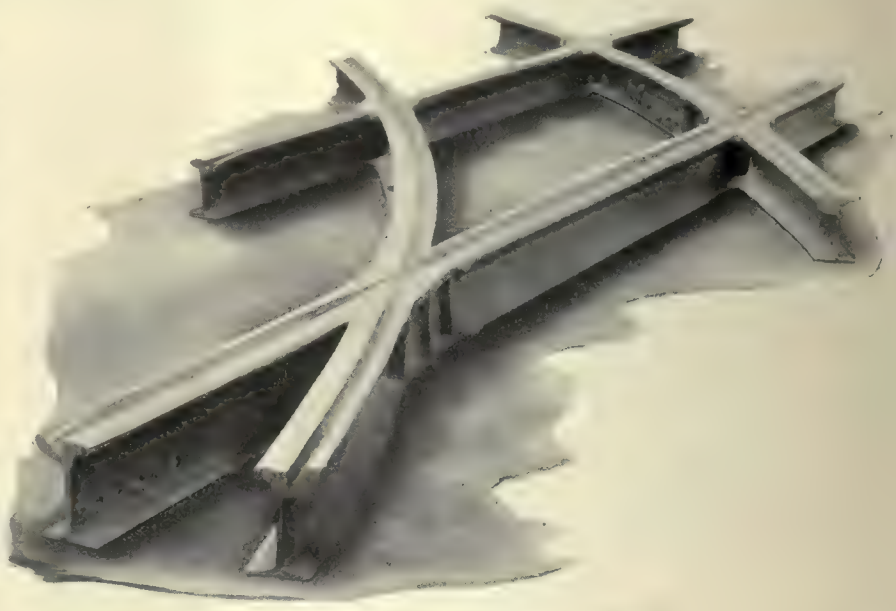
FOR a long time there has been a demand in the electric railway industry for something better than the hard-center type of special trackwork construction and not quite as costly as the solid manganese type. Anything of this kind would have to meet the following requirements, as well as that of reasonable cost: (1) ease and uniformity of manufacture; (2) hardness and toughness to resist wear; (3) ease of repair by welding.

The Bethlehem Steel Company, in an endeavor to meet these conditions, has carried on experiments which have led to an unusually successful conclusion.

Other attempts to do this have been made before and many materials have been considered. Several alloy steels, other than manganese, are being tried out in various parts of the country and have made considerable progress. Chrome-nickel has perhaps received the greatest attention, but has not yet completely met the requirements in regard to certainty in manufacturing, cold straightening and reasonable shop cost.

Early attempts at improvement of hard-center special work were along the lines of making plates larger and thicker. This has the disadvantage of weakening the entire structure. The next step was to investigate the use of the casting to reinforce the binding in a manner analogous to that of the use of steel bars for reinforcing concrete. This soon led to short-cutting by welding rails directly to the center. Because manganese steel is not suitable for welding it became necessary to turn to some other alloy. For the moment at least silico-manganese steel has the greatest possibilities in this direction. It has been selected after careful consideration of a number of materials which seemed to have promising possibilities.

Silico-manganese steel is so-called because the silicon and manganese contents, particularly the former, are higher than normal. This steel for several years has been manufactured in very large tonnages for the highest grade automobile springs and other parts subject to great stress and fatigue. It has been used also with great success in the manufacture of punches for making holes in heavy plates, and the steel plants have used it for shearing plates and in cold chipping steel billets. It is only recently that the material has been used in castings for special trackwork and the results have been unusually interesting.



An example of silico-manganese trackwork

Once the type of steel had been decided the next question which arose was that of design. Manganese steel is the only steel that gives good results in large as well as in small castings. No other alloy can be handled so well where long castings are involved. Hence, solid manganese castings continue to be the best form to use for construction for tongue switches. On the other hand, silico-manganese steel is economical in the construction of mates, frogs, and crossings, particularly the last two.

The important thing in the new design was to obtain something which would give the strength of the one-piece cast type. It has already been mentioned that the natural result of investigations was to show that a solid center, thermit-welded to the rails, was preferable to the inserted-plate type of construction. As has been mentioned, one of the advantages of silico-manganese steel is that it can be welded successfully. In the designs developed it has proved possible to heat-treat the centers so as to secure maximum wearing qualities and at the same time not affect the ability

Material	Unpeaned Samples	Block No. 1 — Hammered One Minute 260 Blows per Minute		Block No. 2 — Hammered Two Minutes 260 Blows per Minute		Block No. 3 — Hammered Two Minutes 320 Blows per Minute	
	Brinell Hardness	Brinell Hardness	Reduced Thickness, In.	Brinell Hardness	Reduced Thickness, In.	Brinell Hardness	Reduced Thickness, In.
Silico-Manganese	321	364	0.0020	375	0.0045	387	0.0075
Chrome-Nickel	241	293	0.0040	286	0.0055	277	0.0020
Standard High Manganese	192	387	0.0075	418	0.0090	495	0.0225

to weld the metal. One of the features of the Bethlehem design is to place an extra amount of metal in the floors of the treads and flangeways to provide sufficient metal to which to weld.

In any special trackwork layout there are four items; namely, frogs, crossings, mates and switches. For mates, frogs and crossings, short length castings can be used which lend themselves to good foundry and heat-treating practices. Due to the length of the switches, it is probably best to use the solid manganese type.

Various tests made show the advantages of this new type of construction. To stimulate the battering action of wheels on frogs, crossings, etc., a series of samples were prepared of silico-manganese steel, chrome-nickel steel and standard high manganese steel. These samples were given a peening or hammering test on a No. 5 Rochester high speed hammer, the die being shaped similar to the ball peen hammer. The test pieces were marked off in eight rectangular blocks, numbered 1 to 8, inclusive, with a 1-in. circle in the center of each rectangle. The hammering or peening was kept inside this circle. The rectangular blocks, marked No. 1 on each of the three test pieces, were hammered for one minute at the rate of 260 blows per minute; block No. 2 was hammered for a period of two minutes at the same rate; block No. 3 was hammered for a period of two minutes at the rate of 320 blows per minute. Blocks numbered 4 to 8, inclusive, were left for a future test. Some interesting results were obtained from this comparative test, as shown in the fol'owing tabulation.

All samples were of the standard analysis and recommended for special trackwork. The silico-manganese samples had the triple treatment with oil quench mentioned above. The chrome-nickel steel samples were given the standard air quench treatment recommended for this product, and the high manganese samples were given the standard treatment for that class of steel.

Of the unpeened or normal samples, silico-manganese showed the greatest Brinell hardness, with chrome-nickel next and manganese last. After peening, manganese showed the greatest Brinell hardness with silico-manganese second and chrome-nickel last. Manganese steel, as might be expected, showed the greatest reduction in thickness after peening, which checks out with the well-known characteristics of manganese steel trackwork—to show very rapid wear during the first few months of service while the hardness is being developed, after which the wear is very slow.

Comparative welding tests have been made of the alloy steels mentioned above. The results have confirmed the information that silico-manganese steel can be welded very easily and uniformly.

Reflecting Lights for Cars and Buses

LIGHT reflecting devices, especially designed for use as marker or clearance lights on the front or rear of buses and electric railway cars, have been placed on the market by the Electric Service Supplies Company, Philadelphia, Pa. The need for such devices is readily apparent to the automobile driver of today. In night driving there is a constant doubt as to the exact width of the vehicle he may be approaching and there is always the constant menace of rear light failure and many other conditions which make it advisable to provide better lighting of the front and rear ends of all vehicles.



Typical Rayflector device

Rayflectors have been designed to fulfill this need, without adding to the cost of upkeep or maintenance of the vehicle on which they are installed. Being entirely automatic in operation they never fail to function and in this respect provide one of the essential features of a safety device. Each unit or reflector consists of a solid cylinder of glass, of $\frac{7}{8}$-in. diameter, scientifically designed to concentrate the light. Back of this cylinder is placed an aluminum reflector over which a copper protecting cap is applied and the same hermetically sealed with cement.

In operation, Rayflectors utilize the light of the approaching vehicle and light from other sources in close proximity. The design of the lens and reflector is such that they reflect more than 75 per cent of the original intensity of light back to its source. The approaching driver, therefore, receives an unfailing warning signal which is, in fact, the light from his own headlights reflected back.

The devices are practically indestructible and will withstand rough usage. They are mounted under spring pressure in cast iron or steel holders and present a very neat and attractive appearance. They are supplied in amber, red, green, blue or white.

Renewable Underrun Section Insulator

TO MEET the demands for a section insulator with wearing parts that can be renewed without disturbing trolley or span wires, the Ohio Brass Company, Mansfield, Ohio, has recently put on the market a new section insulator with renewable underrun. This insulator has an ultimate strength considerably in excess of the trolley wire. It is made with a single beam of second growth, oil-impregnated hickory; brittle-free Flecto malleable iron yoke, end castings and end runners; bronze arcing clips and a very substantial fiber runner. Bronze cam tip approaches are also furnished.

Once the assembly is in place, it is unnecessary to disturb trolley or span wires to renew worn parts. The removal of four bolts allows the end runners, arcing clips, cam tips and fiber runner to be renewed. End castings are provided with straight grooves for dead-ending, so that no wire forming is necessary. Arcing clips are of sufficient length and strength, so that it is practically impossib'e for them to release the fiber runner, thus preventing the chance of wheel dewirement. Wheel clearance of $1\frac{1}{4}$ in. is provided. The leakage distance of 5 in. provides an amply safety factor for 600 volts. The weight of the O-B renewable underrun section insulator is about 15 lb.



Section insulator with renewable underrun

Twenty-Year Club in Portland Celebrates

The annual banquet of the Twenty-Year Club of the Portland Electric Power Company, Portland, Ore., was held on Jan. 19, when 66 men and 2 women were admitted to the club, having entered their 21st year of service with the company during 1928. The club now comprises more than 13 per cent of all employees. Frankling T. Griffith, president of the company, addressed the assembly, as did also O. B. Coldwell and W. H. Lines. R. R. Robley, retiring president, was toastmaster. W. P. Strandborg, genial publicity manager of the Portland company, put on an interesting feature of the program. Tribute was paid to six members of the club who died during the year.

Bonus in Wilmington

Bonus checks were distributed recently by Raymond Hunt, general manager of the Tidewater Power Company, Wilmington, N. C., to street car employees for the year 1928 in appreciation of the faithful and efficient service in the safe operation of cars. Every man received a bonus check, and fifteen received checks for the maximum amount of $21, representing $1 for each month in which there were no accidents, $1 for each quarter, and $5 for the year. The total amount distributed was $522. This sum was slightly in excess of the safety bonus checks for any previous year.

In presenting the bonus, Mr. Hunt not only congratulated the men for their conscientious efforts in accident prevention work, but also called attention to the fact that this record could not have been attained had it not been for the co-operation received from the public and for the interest taken by the public in helping the men operate through the busy streets without accidents. He also pointed out that this safety program meant not only the prevention of accident, but more important was the humanitarian side in avoiding suffering and possibly death on the part of passengers and pedestrians.

A similar bonus plan was announced for the year 1929, and each and every man pledged his best effort to operate safely during the coming year.

Oratorical Contest Decided in Kansas City

First prize in the oratorical contest sponsored by the transportation department of the Kansas City Public Service Company, Kansas City, Mo., was won by J. R. McMurran, who also won $25 in cash and a wrist watch given by the company. This operator at 18th and Olive Division led a field of 70 orators from the transportation department in the first contest of this kind ever held. L. F. Demming won second honors, or $15, while third place, or $10, went to A. E. Behrens. The subject was "The Street Railway Problem in Kansas City."

COMING MEETINGS OF *Electric Railway and Allied Associations*

Feb. 14—**Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

March 1—**Metropolitan Section, American Electric Railway Association, 33 W. 39th St., New York, N. Y.**

May 1-3—**Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

May 13-15—**National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

June 5-7—**Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

June 21-22—**New York Electric Railway Association, Bluff Point, N. Y.**

June 27-28—**Central Electric Railway Association, Michigan City, Ind.**

Sept. 28-Oct. 4—**American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Fare Increased in Holyoke

The Massachusetts Public Utilities Commission has upheld the petition of the Holyoke Street Railway, Holyoke, Mass., for an increase in fares and has dismissed all protests.

Effective as of Feb. 1, 1929, the zone tickets went on a basis of three for 25 cents, and tickets for school children on one of ten for 42 cents. The present rate of fare in the zones affected by the new schedule is four tickets for 30 cents, and the price of tickets for school children is ten for 38 cents.

The finding follows in part:

The evidence showed that traffic on the railway had been falling steadily in recent years and had fallen off considerably in the past year. Despite economies in operation which had been put in effect by the company, and despite the increase in fares which went into effect in the fall of 1927, the company, after laying aside an insufficient amount of depreciation, earned only enough money to pay a dividend of 2 per cent. It is obvious that the company is entitled to be allowed to earn more money if it can. After consideration of all the facts, we are of the opinion that petitions against fare increases should be dismissed.

George E. Pellissier, manager, testified that the income of the company had declined by $50,000 in the last year, and that only for the rate revision made in 1927 the decline would have been $100,000 greater. This increase temporarily arrested the decline in income.

Hearing on Increased Fare for Superior Scheduled

A hearing on the application of the Duluth Street Railway for permission to increase its rates in Superior, Wis., will be held at Superior on Feb. 18. It asks for the increase on the grounds that, under the present rate, the operating income is insufficient. According to its financial statement, the rate of return is only 1.17 per cent of the fair value of its property as set by the Wisconsin Railroad Commission. No specific rate is requested. The existing rate will, if continued, be confiscatory, the petition stated.

The total operating revenue, including the non-operating income of the company, for 1928 was $1,907,125, a decrease of $38,369 over 1927, according to a statement made in behalf of the company.

Proposals Submitted for Springfield, Ohio

The Twin Coach Corporation of Kent, Ohio; The City Rapid Transit Lines of Newark, Ohio; Alexander S. Drescher, Brooklyn, N. Y.; and Samuel Lipp, Cincinnati, have submitted bids to furnish transportation service for the city of Springfield, Ohio. Request for bids was made by Springfield officials several weeks ago.

City officials were advised in a communication, submitted at the same time as the bids on the transportation facilities, that the Cincinnati, Hamilton & Dayton Railway and the Indiana, Columbus & Eastern Traction Company, which plan to merge, are now actively engaged with the Springfield bondholders protective committee for the formulation of a plan for a unified transportation service over Indiana, Columbus & Eastern-Springfield Railway tracks, with one or more bus routes included.

Robert W. Flack, city manager, said that negotiations would continue for two weeks, as the city is primarily interested in a transportation system for the community, and will be willing to consider any feasible plan for its establishment.

Bonus for Rushville Employees

Employees of the Indianapolis & Southeastern Railroad, formerly the Indianapolis & Cincinnati Traction Company, Rushville, Ind., will receive a 5 per cent bonus on their January pay under a new system started by C. T. DeHore, president of the company. The bonus is in return for courteous service to passengers and care in handling cars. The first dividend check will be mailed on April 1, as the bonus is to be paid in quarters. One of the chief factors in providing this bonus to motormen is that they keep their cars running on scheduled time. This bonus applies to employees working on both divisions of the road.

Increased Tariff in Wheeling Suspended

A tariff increase, filed on Jan. 31 by the Wheeling Traction Company, Wheeling, W. Va., was recently suspended by the Public Service Commission. The increase, which was from 5 to 6¼ cents, was to take effect on March 3 and hearing on the application was scheduled for Feb. 9. Railway lines are operated by the Wheeling Traction Company connecting Moundsville, Wheeling and Weirton, a distance of 44 miles, on the West Virginia side of the Ohio River, and also between various communities in Ohio.

Prior to the Christmas holidays, announcement was made by A. C. Spurr, general manager of the Wheeling Traction Company, of his company's intention to make application to the Interstate Commerce Commission for an increase in rates. It was desired to make this increase uniform throughout the system by subsequent application to the Ohio and West Virginia Commissions. He said that the company was seeking an increased fare only after adopting every means of efficiency and economy; that during the past 22 months there had been a deficit from operations in excess of $200,000 and that to continue the improvement program required at least sufficient revenues to pay all operating expenses.

The tariff filed with the Interstate Commerce Commission requested a universal zone rate of four metal tokens for 25 cents and a 10-cent cash fare. This meant an increase for the Ohio and interstate riders. Advance in the commutation rates was requested in about the same proportions. The tariff in interstate traffic went into effect on Jan. 20.

The company was granted a general increase in rates in 1920 and in 1922 a decrease was effected in these rates. A partial increase was secured in interstate and Ohio rates in 1925, but the last general increase applicable to the transportation system as a whole was in 1920.

Wanted—A New Headpiece for Vancouver Buzzer

The coming of spring is blamed by the British Columbia Electric Railway, Vancouver, B. C., for its desire for a new headpiece on *The Buzzer*, its official pamphlet. It claims it's been running along for more than twelve years with the same old lid, and now it wants something new. Accordingly, all artists and pseudo artists have been invited to draw a new heading for the front page. To the design of the one that is chosen as most appropriate will be paid $25. According to the rules, any professional and non-professional artist can send in any number of pen and ink designs which must not be more than 2 in. deep, and must permit the addition of the usual date line, either within or without this depth. All designs are to become the property of the British Columbia Electric Railway. The contest closes Feb. 22.

Needs of Wisconsin Company Told to Commission

Hearing on the application of the Mississippi Valley Public Service Company for an increase in fare from 7 cents to 10 cents was held before the Wisconsin Railroad Commission at La Crosse, on Feb. 5. The company is also asking for authority to abandon the Badger Street line and take one car off the Seventh Street line.

In This Hard-Boiled Era

A LONE fare check issued by the United Railways & Electric Company, Baltimore, has been received by that company from a woman in Cincinnati. Accompanying it was the following letter:

I am sending you a car ticket I found in my work and I thot I wad send it to you. It wadnt Benefit me eny for I cant youse it here. I thot it wad Be rite to send it to you. Money is money now days. I noe it wad be to me. If I could spent it I wad have spent it and several more for I have worked for 20 years and I noe sumpthing about it. I hafto walk if I run short through the weak so I hope you will precheat this little ticket when it arrives Home.

The United has sent the woman 10 cents in payment for the token.

Higher Fare Experiment in Champaign-Urbana

The Illinois Power & Light Company and the cities of Champaign and Urbana, Ill., have received approval from the Illinois Commerce Commission, for their six-months' trial of a 6¼-cent fare for cars and buses in the two cities. On Feb. 1 the new schedule became effective. Books of 52 tickets are sold for $3.25. Tickets unused during the calendar month for which they are issued will be redeemed by the company at 6 cents each.

Hearing Set on Electric Bond & Share Plea

Argument on the application of the Federal Trade Commission for an order requiring the officers and employees of the Electric Bond & Share Company to produce certain records of the company and to submit to an examination, will be heard on Feb. 11 by Federal Judge Knox. Recently Judge Mack declined to act because he had relatives holding stock in the company. Judge Thacher also declined to act because he was a counsel for the company before he became a judge. The company denies that the commission has jurisdiction.

Ten Cents in Sioux City

Under provision of its franchise with Sioux City, Ia., the Sioux City Service Company on Feb. 7 put into effect a 10-cent car fare, supplanting the present 9-cent fare. Tokens will be sold at eleven for $1. E. L. Kirk, vice-president and general manager, announced the increase after conference with city officials and explained that continual decrease in railway patronage with mounting costs of operation made the higher tariff necessary. Eight months ago the company raised its fare from 8 to 9 cents.

Revenues in 1928 were $36,000 less than in 1927 and $282,355 less than 1921. On the basis of its legal return of 6.5 per cent, the company was entitled to $324,722 last year, but the actual income was $125,392, $199,330 below the legal limit. The franchise provided for a 1-cent increase in the event the income fell $75,000 below the legal return, but the 10-cent fare is the limit provided in the contract and any further increases will necessitate a new agreement. Passenger revenue for last year was $772,598 and other income $6,298. Expenses included conducting transportation, $207,938; taxes, $86,999; power, $80,164; miscellaneous, $78,606; ways and structure, $75,496, and depreciation, $70,000.

Flocking to the Omaha Street Cars Out of the Cold

While Omaha, Neb., has been held in the grip of zero or near-zero weather, the Omaha & Council Bluffs Street Railway has been profiting, in daily receipts between $600 and $1,000. This figure is obtained by comparing the records of mild, snowless days with those on which cold and snow abound. Is it that the warm street cars are tempting when one faces the difficulty of driving an automobile in cold weather?

Vote Down Green Line Fare Increase

City Commissioners of Covington, Ky., recently voted unanimously against granting the Cincinnati, Newport & Covington Railway a higher rate of car fare. The vote came abruptly when Mayor Donnelly presented a letter from H. C. Blackwell, president of the company, asking the commissioners to appoint a business man on the committee of eight from Northern Kentucky cities to confer with the company relative to granting increased fares.

The so-called Green Line holds perpetual franchises over Covington streets, established after litigation years ago in the state and federal courts. These franchises stipulate a 5-cent fare, including transfers. The company would relinquish its perpetual rights for a twenty-year franchise with a 10-cent fare or three tickets for 25 cents, if an agreement to this effect can be arranged.

Recent Bus Developments

Boston & Maine Buses Into Boston

With Chairman Henry C. Attwill dissenting, the Massachusetts Department of Public Utilities has granted the Boston & Maine Transportation Company a certificate of public convenience and necessity to operate its passenger carrying buses into Boston. This certificate applies to the Fitchburg-Cambridge line now in operation and allows the buses to carry the passengers into Park Square, Boston, prohibited previously. The line starts at Keene, N. H., and passengers boarding the bus at that point were allowed to come into Boston, but any passenger boarding east of Fitchburg had to debark at Kendall Square, Cambridge.

Two restrictions attached to the certificate follow:

That this certificate is issued upon the condition that vehicles operated hereunder shall not, when bound toward Boston, take on or admit passengers in Cambridge or Boston nor, when bound in the opposite direction receive passengers to be discharged, nor stop to discharge passengers in Boston or Cambridge.

That this certificate is issued upon the condition that the applicant shall with its vehicles make such connections with such railroads or street railways at such points as the department may from time to time order, and shall in connection with said railroads or street railways provide such through transportation upon its vehicles and upon such railroads or street railways and such joint rates therefore as the department may from time to time order.

One-Mile Extension in St. Paul

The first bus line street car extension in St. Paul, Minn., has been put in operation following an order by the Minnesota Railroad & Warehouse Commission. It operates a distance of about 1 mile. The company offered the substitute bus service, giving as adequate service, in preference to building an extension of its railway lines. The fare is the same as on street cars, with transfers to and from the cars.

Taxi Ordinance Shelved in Seattle

All chances for an early agreement in the City Council, of Seattle, Wash., on the question of an exclusive taxicab franchise for Sam V. Taggart and his associates, have been removed by the Council shelving the franchise ordinance. John E. Carroll, chairman of the franchise committee, has asked the public safety and utilities committee to assist him in the preparation of some temporary regulatory measure for Seattle taxicabs. A new measure, placing the taxicabs under a license fee of about $50 a year per cab, and putting all cabs under meter service rates, providing for extra charges for extra passengers, is proposed.

Clouds Lifting in Columbia

The transportation problem in Columbia, S. C., a costly and stubborn jam it has proved to be, now bids fair to be solved, though the situation so far as it concerns the restoration of railway service is still with the courts. Responding to the insistent demands of the citizens that something be done the Columbia City Council recently decided to give "some bus company" protection from railway competition for a period of three years, no matter what the courts might decide as to compelling the restoration of street cars, withdrawn from service in March, 1927.

Immediately after this announcement was made, the Columbia Bus Company, which has been giving a "sort of service," ordered seven 29-passenger gas-electric buses and two 17-passenger buses. These nine vehicles, with the equipment the company already had, gave it a fleet of 30 buses and with this fleet it was able to cover the city fairly well. The bus company, in its efforts to make good under the protection offered by the Council, also placed small placards, with printed schedules, at each street intersection in the retail business section of Columbia, giving the time to the different suburbs.

When the City Council saw that the Columbia Bus Company was seriously trying to improve its service, it issued orders that the city ordinance relative to "jitneying" should be rigidly enforced. Under this ordinance, jitneys and unregulated buses are prohibited from "cruising" for passengers and required to have regular stands.

Heretofore, jitneys have operated in the peak hours, picking up passengers anywhere and carrying them to their doors. Some of this "jitneying" was a sort of "bootlegging," but since the bus company was not giving the service the people demanded, the practice was winked at for it was better than nothing. But this practice ate steadily into the revenues of the bus company and made it hesitate to invest more money in equipment. Too, there was always the menace that the Supreme Court would hand down a decision ordering the railway to restore street car service. The tracks are in position; the feed wires and overhead are in place and the cars are in the carhouse so the bus company hardly knew where it stood.

Not in so many words, but in a way no less positive, the Council has indicated to the bus company that if it can not make good under the protection now afforded, it should quit.

Taxi Developments in Worcester

Railway officials in Worcester, Mass., are watching with interest the latest development in the taxicab war in that city. Sometime ago a cab company startled other similar concerns by putting in a fleet of taxis that carried up to four passengers for 35 cents to any part of the city. The other companies were forced to meet the price change. However, while the 35-cent cab service had a wide appeal it was not always so convenient as the railway.

Now the taxicab war has been renewed with another concern starting a line of 25-cent cabs. While it is anticipated that this too may cut into the patronage of the Worcester Consolidated Street Railway, there is already evidence that the taxi companies cannot continue the service at a profit. With the 25-cent cab fares this will become a problem even more serious. Moreover many patrons of the 35-cent cabs feel the necessity of tipping the driver and the cost is more often 50 cents rather than 35 cents. The railway fare is 10 cents.

The Worcester Consolidated Street Railway is not disposed to permit taxicab operators to solicit business in violation of the rules laid down by the license commission in Worcester. Recently one license was taken away from a driver who was alleged to have entered a restaurant to solicit business. A clean bill was given to 47 others against whom charges had been made, but the presentation of the charges is a warning to the taxi drivers.

The company is at present maintaining its new service policy and, while the taxicab competition is a potent factor in determining business policy, the present efforts of railway officials are directed only against palpable violations by the taxis.

Reduced Fares Proposed on Nashville Line

The Tennessee Transportation Company on Feb. 2 filed an application with the Tennessee Railroad & Public Utilities Commission for authority to put into effect reduced fares on commuters' tickets between Nashville and Old Hickory. This company, a subsidiary of the Nashville Railway & Light Company, operates buses in co-operation with the railway service in Nashville and environs, and recently was awarded a certificate of convenience and necessity for operating buses to Old Hickory. The reduced rate on commuters' tickets is 50 cents under the former charge.

New Haven Would Finance Bus Subsidiary

The New York, New Haven & Hartford Railroad, New Haven, Conn., is seeking permission in a bill before the Legislature to loan money to the New England Transportation Company, a bus subsidiary.

Financial *and* Corporate

Emmanuel Interests Buy Tulsa Property

The Tulsa Street Railway, Tulsa, Okla., was sold under foreclosure in Tulsa on Jan. 23 to Albert Emmanuel, representing a majority of the first mortgage bondholders, for $233,334. Mr. Emmanuel was the only bidder.

Reorganization of the property will follow, but no immediate change in management is contemplated. C. H. Bosler, president of the company since it began business in that city in 1907, will remain executive head. The Tulsa property has been in receivership for more than a year.

Protective Committee for Ohio Company Formed

Holders of the Youngstown & Ohio River Railroad first mortgage 5 per cent bonds, on which the company ceased interest payments in April, 1927, have formed a bondholders' protective committee, which will have full power to take such action as may be necessary to protect the bondholders' interests, and, if there is a favorable opportunity, to sell the bonds. The committee consists of Charles Delany, Charles E. Denison and Francis Ralston Welsh. Bondholders are urged by the committee to send their bonds to the Girard Trust Company of Philadelphia, which has been named as depositary.

Illinois Valley Change Effected

Approval has been given by the Illinois Commerce Commission to the change from the Illinois Traction, Inc., Illinois Valley Division, to the Chicago & Illinois Valley Railroad. Officers of the new company, referred to in the Feb. 2 issue, are:

J. E. Johnson, president; H. L. Hanley, executive vice-president; L. E. Fischer, vice-president; Henry I. Green, vice-president and general solicitor; E. W. Fowler, vice-president and general manager; D. H. Holmes, secretary; P. L. Smith, treasurer; C. F. De Witt, assistant secretary; W. M. Irwin, engineer maintenance of way; R. G. Near, general freight and passenger agent; J. H. Comyns, superintendent of transportation; R. C. Holcman, auditor; T. H. Ruyle, master mechanic; F. E. Fisher, industrial agent.

New Director in Cincinnati

Stanley M. Rowe, vice-president and treasurer of the Shepard Elevator Company, Cincinnati, was elected a director of the Cincinnati Street Railway at the annual meeting of the stockholders on Jan. 30. He succeeds John B. Hollister, local attorney, who resigned.

Slight Decline in Traffic

Washington Railway & Electric Company reports 97,967,102 passengers in 1928. In addition 7,841,465 people rode company buses

DURING the year 1928 the Washington Railway & Electric Company carried 74,462,681 revenue passengers and 23,504,421 transfer passengers, or a total of 97,967,102 passengers. This is a decrease of 1,286,623 revenue passengers compared with the previous year, equivalent to 1.7 per cent. In his annual report to the stockholders President Ham said that when it is considered that the use of private automobiles is the largest contributing cause of the loss in street car traffic and that the number of automobiles registered in the District of Columbia in 1928 increased 18 per cent over the previous year, this decrease in traffic is not so much as might be expected. It is also of interest to note that statistics compiled by the American Electric Railway Association indicate that the loss of traffic in the railway industry is general throughout the country and that the loss in Washington is considerably less than that suffered in several sections of the United States.

The loss in traffic caused a decrease of $65,456 in operating revenue for 1928, but the company was able to effect a reduction in operating expenses in excess of the loss in revenue, thereby showing an increase in operating income of $22,818 for the year. The accompanying statement shows the year's income record.

Substantial renewals and repairs to track structures were carried to completion in 1928, thus continuing the practice that has been followed for the last ten years. The expense of maintenance of way and structures, together with allowances for depreciation, totaled $788,589. Major projects covered the reconstruction of 2.4 miles of underground conduit track and $\frac{4}{10}$ mile of overhead trolley track, at a total cost of approximately $255,000.

In 1928 there were placed in operation twelve new one-man cars, costing approximately $172,000. These were equipped with automatic rear exits, quadruple motor equipment and leather covered de luxe seats. Twenty-nine one-man cars were equipped with automatic rear-exit doors, at a cost of approximately $32,000.

The fleet of buses was increased to 84 by the purchase of thirteen Yellow Coaches in 1928, costing $94,687, and three Dodge-Graham and one G. M. C. bus, acquired through the purchase of the Montgomery Bus Lines, Inc., operating from Rockville, Md., to the center of Washington. During the year the buses operated 2,669,792 miles over routes in excess of 115 miles; carried a total of 7,841,465 passengers with receipts aggregating $554,873. These buses are operated as auxiliary to and in co-ordination with street car service. All of the bus lines not only afford convenience to the people residing in the territories directly served but make available more extensive transportation facilities for all those who use the service by reason of the liberal transfer privileges to and from the rail lines.

Due to the congestion caused by the constantly increasing number of automobiles on the streets of Washington, the company is making every effort to maintain its track and equipment to give Washington and outlying districts the best and safest transportation service. In spite of these efforts, the increase of traffic on the streets of Washington has brought about an increase of approximately 8 per cent in the number of accidents in 1928. Accidents with automobiles were 72 per cent of the total during the year.

The unification agreement entered into by The Capital Traction Company, the Washington Railway & Electric Company and Harley P. Wilson, owner of 21,237 shares of the stock of the Washington Rapid Transit Company, was approved by the stockholders of the company March 14, 1928. Certain modifications of the original agreement were required by the Public Utilities Commission before approval, and an amended contract embodying such modifications was approved by the stockholders at an adjourned meeting held April 6, 1928. Extensive hearings were had before the House District committee, which finally recommended the passage of legislation approving the contract. The matter is now pending before the Senate District committee.

CONDENSED STATEMENT OF EARNINGS AT WASHINGTON

Gross earnings from operation	$5,783,826	
Miscellaneous income (including dividends from Potomac Electric Power Company)	1,431,367	
Gross income		$7,215,194
Operating expenses (including depreciation), taxes and miscellaneous charges	4,731,042	
Interest on funded and unfunded debt	750,196	
Payment of dividends on preferred stock	425,000	
Payment of dividends on common stock	455,000	
		6,361,239
Balance of income for year 1928 credited to profit and loss		$853,955
Miscellaneous items credited to profit and loss		3,146
Total credited to profit and loss during the year		$857,101

The total bonded debt of the Washington Railway & Electric Company and its subsidiaries, including the Potomac Electric Power Company, now outstanding with the public is $23,814,200. Adding to this the $15,000,000 capital stock of the parent company, and $7,002,850 outstanding capital stock of subsidiary companies, makes the total outstanding capital at this time of $45,817,500. This excludes from outstanding bonds those purchased for sinking fund and for temporary investment.

During 1928 the amount of taxes accrued for the entire Washington Railway & Electric Company's system was $1,418,184 of which $940,555 was against the power companies, and the balance against the transit properties. These taxes consist of the 4 per cent gross earnings or gross receipts tax, federal income tax, real estate tax, personal property tax, crossing police tax and certain licenses.

In addition to the insurance and pension benefits flowing to the members of the Washington Railway Relief Association, sick benefits are allowed its members, the total being limited to $200 per member in any one year. In 1928 there was expended for this purpose the sum of $14,755.

Brooklyn Merger Being Effected

Negotiations for a merger between the Brooklyn-Manhattan Transit Corporation and the Brooklyn City Railroad, which between them operate virtually all the surface lines in Brooklyn, N. Y., are said to be headed toward a successful conclusion.

The lines of the Brooklyn City Railroad were included in the old Brooklyn Rapid Transit Company system, but split off when the latter company went into bankruptcy and continued to be operated separately after the reorganization of the old Brooklyn Rapid Transit into the present Brooklyn-Manhattan Transit Corporation.

Transfer to Worcester Consolidated to Be Effected

Approval of the transfer to the Worcester Consolidated Street Railway, Worcester, Mass., of the franchise and property of the Worcester & Shrewsbury Street Railway and the Worcester & Shrewsbury Railroad is expected by the Massachusetts Department of Public Utilities, which heard the matter recently. These two lines exist now in name only, the Consolidated operating over the lines and holding all stock.

According to Clark V. Wood, president of the Springfield Street Railway and of the Worcester Consolidated, both roads have been leased for years to the Consolidated. Actually all stock in both roads is owned by the New England Security & Investment Company, a holding company for the so-called Consolidated group. Mr. Wood is also president of these roads. The Worcester & Shrewsbury Street Railway lines are those over which the Consolidated operates its cars through Shrewsbury.

Capital Stock in Elmira Increased

The Elmira Water, Light & Railroad Company, Elmira, N. Y., has filed a certificate in the office of the Secretary of State increasing its capital stock from $4,096,200 to $6,200,000.

Messrs. Wilson and Emerson on Cleveland Directorate

At the annual stockholders' meeting of the Cleveland Railway, Cleveland, Ohio, on Jan. 30, Paul E. Wilson, vice-president and secretary, and Ralph W. Emerson, vice-president and general manager, were elected to the board of directors. They take the places of Leonard C. Hanna, Jr., and Fred W. Ramsey. Mr. Hanna withdrew from the board because his business interests took him out of Cleveland frequently, while Mr. Ramsey is devoting all his time to the Y. M. C. A., of which he recently was elected general secretary.

In his report to the stockholders, Joseph H. Alexander, president, declared the company had done everything within its powers to avert an increase in fare to 8 cents. The next move is up to the city of Cleveland, he said, which can reduce the company's expenses by clearing up the traffic situation and increase the company's revenue by requiring long-haul riders to pay more nearly the cost of their transportation.

Two drastic steps were taken by the company in 1928 to avert an increase in fare, Mr. Alexander reported. One was an arbitrary transfer of $125,000 from the ticket float to the operating reserve and the other was an increase of 2 cents a car-mile in the operating allowance and a reduction of 2 cents a car-mile in the maintenance, depreciation and renewal allowance.

It was his belief that, if general conditions of travel and expenses of 1928 continued in 1929, the operating allowance must remain at 31 cents per car-mile and might have to be increased 1 cent.

Mr. Alexander said:

> We may not again reduce our ticket float. We may not again waive part of our allowance for maintenance, depreciation and renewals. Income is scarcely adequate to present total expenses. We believe the desire of the company to avoid charging an increased rate of fare has been well evidenced.

More Moves Toward Washington Merger

Apparently the merger of Washington's street railway and bus lines has been brought one step nearer to realization. On Feb. 6 Senator Capper reported to the Senate that his committee had approved the unification compact with the addition of a few modifications which they thought essential to the public welfare. The merger resolution is now on the Senate calendar, but despite this it is not believed that congressional approval is likely this session. In a minority report made on the measure to be filed by Senator Blaine, of Wisconsin, the opinion is expressed that, in providing for a revaluation of the properties, Congress should specify that the prudent investment method be employed.

The report submitted to the Senate on the subject, after calling attention to the desirability of unified railway and bus service, states that public sentiment is overwhelmingly in favor of a merger of the several properties. The demand recently has become particularly acute for a merger, the report continues, because of the petition of one of the railways for increased fares. Emphasis is placed on the clause relating to charges made by the holding company, which is described as protecting the company from being "exploited through the device of so-called super service fees."

The report says these advantages will accrue as the result of a merger:

Better service through unification; immediate saving through universal free transfers; protection for two years against any fare increase; protection thereafter and lower fares if possible under any circumstances, through fair valuation and a share for the public in the proceeds of the economies of joint operation.

St. Louis Valuation Argued

The valuation case of the St. Louis Public Service Company was argued before the Cole County Circuit Court at Jefferson City on Jan. 30, the city of St. Louis having appealed from the decision of the Missouri Public Service Commission which granted the company a flat fare of 8 cents and fixed its rate base valuation at $63,500,000 as of Jan. 1, 1927. Counsel for the city argued that the valuation should not exceed $53,000,000. It was contended that the state commission gave undue weight to the reproduction cost new theory in granting the company a value of $63,500,000 on its operating properties. The city held the commission should have used the prudent investment theory for the valuation.

The city also contended before Circuit Judge Westhues that 7 per cent would be a reasonable return, whereas the commission granted 7.14 per cent, and that a cash fare of 8 cents or two tokens for 15 cents would be a justifiable maximum and that with enterprising, business-like management it should be possible to reduce the fare to 7 cents; that the commission ignored the downward trend of material prices and that the valuation of land held by the company was excessive by $1,500,000.

The company was barred from appealing from the decision, as it was granted the fare asked for, although the valuation was much below the $75,000,000 the company asked. It reasserted its claim to a valuation of $75,000,000, a rate of return of 8 per cent, and an annual depreciation allowance of $1,500,000 which the commission reduced to $800,000. Both sides will file briefs.

Book Reviews

British Electrification Committee Reports to Ministry of Transport

Published by His Majesty's Stationery Office, London, 1928, and distributed by British Library of Information, 5 East 45th Street, New York City. Fourteen pages, 5 diagrams and 3 maps. Price $1.70 net.

Following the formation of the Ministry of Transport the railway electrification committee was formed in November, 1927, to review the recommendations of the electrification of railways advisory committee, 1921, and to report what modifications, if any, should be made in these recommendations, having regard to the developments which have taken place since that date.

The principal recommendations in the present report are that direct current should be used for all British electrifications at 750 or 1,500 volts, with 3,000 volts subject to approval in special conditions. All motors, either for higher or lower voltage systems, should be capable of operating satisfactorily on the higher or lower maximum standard voltages respectively. Generation should be in the form of three-phase alternating current at 50 cycles and suitable voltage. For higher voltages overhead collection with uninsulated rail return is specified, while for the lower voltage the third rail with uninsulated rail return is standard, except that a fourth insulated rail may be permitted for tube lines, and for limited extension of systems now employing an insulated return.

Two standard clearance limits are specified, the first having a maximum height of 12 ft. 8 in. and the second a height of 13 ft. 2 in. Clearance diagrams are given in the report. Specifications for third rail and overhead clearances are also included. The three insert maps cover respectively England and Wales, Scotland, and London and its environs, showing in color the clearance limitations on all the main line railways of Great Britain.

Electrical Engineering—Alternating Current

Chester L. Dawes, S.B. Assistant Professor of Electrical Engineering, Harvard Engineering School. Published by the McGraw-Hill Book Company, Inc., New York, N. Y. 620 pages, illustrated, price $4.

Planned primarily to meet the needs for courses in alternating current which are semi-elementary in character, such as are given in the engineering schools, this book also contains much information of use to electrical engineers of railways. The chapter on transmission of power describes line and substation practice in transmission systems and gives line calculations. The various types of lightning arresters are treated and much information is given on line construction. This chapter also includes material on arrangement and operation of substations, a treatment of automatic substations and the latest equipment now being used.

Various pieces of alternating current equipment are discussed in special chapters such as those on transformers, induction motors, and others on synchronous motors and rectifiers.

Boston Elevated Railway Co-operation —1928

Index to Volume 7, 192 pages.

A bound indexed copy with title page of "Co-operation," the bulletin of the employees of the Boston Elevated Railway, Boston, Mass., published monthly is ready now. The twelve issues of 1928 are included and all important articles, tables and diagrams comprise the index. It is suggested that copies be preserved and filed with the title page and index. An index including "Don't Trouble Trouble" in verse by J. E. Hungerford and autographs of 45-year men testify to the human interest features in Co-operation.

Principles of Scientific Purchasing

By Norman F. Harriman. McGraw-Hill Book Company, New York, N. Y. 301 pages; price $3.

FUNDAMENTALS of the purchasing function rather than the technique of buying are dealt with in this concise account of the application of economic and engineering principles to the function of purchasing in industry. The rather meager literature in the form of books in the field of purchase has been devoted for the most part to the practical details in the purchase of particular commodities and to standard forms and routine office methods. Realizing the inadequacy of the available literature in this "buyers· age," Norman F. Harriman has studied in considerable detail the fundamental economic, technical, financial, legal, psychological and inspection matters connected with purchasing.

Briefly tracing the evolution of merchandising and the market, the author arrives at a definite outline of the knowledge required of a modern purchasing executive. He then deals with the importance of the business of buying and considers separately the various aspects of the purchasing function. There are a number of economic forces that have come into play during the past two decades, among the most important of which are the higher price levels of today, the modern approach to standardization and mass production of commodities and the resulting decreased cost per unit, and the economies of mass purchasing. Appropriateness, quality, service and price are the buying factors, and their relative importance is in the order indicated.

Value should be distinguished from price. The author points out that perhaps one of the greatest economic lessons for a purchasing agent to learn is that the first cost is not the last cost; that the cost per unit of service is what determines the value of a product.

Good judgment in purchasing requires a combined knowledge of sound finance and sound economics. Financial problems are very definitely related to the phases of the business cycle. To purchase intelligently, the purchasing agent should be conversant with the financial resources of his company and should realize that bills for commodities contracted for have to be met. The purchasing department should closely collaborate with the financial department, should keep a minimum investment in the inventory, should study the relative advantages of long and short-term contracts, and the fundamental economic conditions and price trends.

On the psychological aspect of purchasing, the author raises the question: why should not the purchaser as well as the vendor determine the psychological moment in a sale. From the standpoint of the psychology of business relations, the purchaser's chief interest may be said to be in the manner in which his mental attitude affects the transaction. The purchaser has the power to discriminate, he has sources of information other than from the vendor alone, and his greatest offense, which cannot be over-emphasized, is his knowledge of his own reaction in the transaction. By close observation and by observing the vendor's tactics, the purchaser can soon come to recognize the kinds of persuasion to which he ought to control his reactions.

Fundamental principles that govern the business of buying are: Plain common sense, practical judgment, foresight, initiative, diversified knowledge, and ability for analysis. Of these, the ability to analyze a problem or reduce it to its elements is one of the most valuable. This faculty assists in the determination of the facts, and once the facts are known the solution of most business problems is relatively easy.

Supplementing the chapters on the organization and procedure for scientific purchasing, and the control of quality purchases, the author includes an extensive appendix on the purchasing organization and procedure of the Western Electric Company, the New York Central Railroad, the United States Navy, the Pittsburgh Plate Glass Company, and the certification and labeling plan of purchasing.

The author's wide experience in dealing with the practical problems of purchasing and its related subjects makes the contents of the book particularly adaptable to the electric railway industry.

Personal Items

T. Norman Jones Executive Vice-President at Richmond

T. Norman Jones, general manager of the Virginia Electric & Power Company at Norfolk, Va., for a number of years, has been appointed executive vice-president of the company with headquarters in the general offices at Richmond. Mr. Jones assumed his new position on Feb. 1.

Mr. Jones has been actively identified with the Virginia Electric & Power organization for many years. He began as mechanical and electrical engineer in 1906. In 1907, he went with the former Richmond & Chesapeake Bay Railway, the electric interurban line between Richmond and Ashland, but returned to the Virginia Railway & Power Company a few years later as chief superintendent of railways. On Jan. 1, 1916, Mr. Jones was appointed assistant general manager of the company's properties at Norfolk. Later he was made general manager. Mr. Jones is a native of Richmond. He was graduated from the University of Virginia.

L. C. Lemon Will Go to Muscatine

L. C. Lemon has resigned from the Tri-City Railway and the Cedar Rapids, Davenport & Muscatine Railway lines in Davenport, to become affiliated with A. R. Menary, of Cedar Rapids, in establishing a motor coach system for the city of Muscatine.

Ohio Commission Completed

Judge Frank W. Geiger, of Springfield, has been appointed a member of the Ohio Public Utilities Commission, by Governor Cooper. In this capacity he fills the place left vacant by the expiration of the term of James W. Huffman. Judge Geiger served thirteen years as probate and juvenile judge of Clark County and for seven years presided in the Common Pleas Court of the county. Since 1923 he has been engaged in the active practice of law in Springfield.

With this appointment and the naming by Governor Cooper of Roscoe McCulloch as chairman of the commission, reorganization of that body has been completed.

Frank Mulks Assists President Shoup

In connection with the advancement of Paul Shoup to the presidency of the Southern Pacific Company, Pacific System, referred to previously in the ELECTRIC RAILWAY JOURNAL, Frank Mulks was appointed assistant to President Shoup. He is termed a Pacific Electric product, beginning in the accounting department of that company, later becoming assistant to the vice-president and general manager, Mr. Shoup, and going with him to San Francisco as office manager of the Southern Pacific Company. Mr. Mulks then became assistant to the executive vice-president, again Mr. Shoup, and more recently was honored along with his chief.

Frank A. Forty Heads Schedule Department in Chicago

Frank A. Forty has been appointed superintendent of schedules of the Chicago Surface Lines, Chicago, Ill., succeeding Daniel Boal, who died on Jan. 20.

During the summer vacations while he was attending the University of Illinois, he was connected with the mechanical department of the Chicago Surface Lines. After graduation he was employed for two years in the railway engineering department of the Westinghouse Electric & Manufacturing Company. During the World War he enlisted as a private in the 28th Division, and later was made captain in the 37th Engineers and served in France, making a splendid record in the Meuse Argonne offensive. In 1920 he was employed in the Beeler Transportation Survey in Chicago and the following year was engaged by the Surface Lines to assist in the schedules department. Since that time he has been connected with that department.



Frank A. Forty

Mr. Forty was graduated from the University of Illinois in electrical engineering in 1915 and has a good background of experience particularly fitting him for the position to which he has been appointed.

DR. JULIUS KLEIN is sailing shortly for Europe, where he will attend the annual meeting of the commercial attachés to be held in Vienna. He is also making some observations which have to do with certain economic questions concerning the Mediterranean area.

Illinois Terminal Appointments Announced

A. P. Titus, new vice-president, assigns Messrs. Powell, Twohy, Bodge and Kester to his staff

A. P. TITUS, formerly vice-president and general manager Chicago & Alton Railroad, who was recently appointed vice-president in charge of operation of the Illinois Terminal Railroad System, will have charge of operation of both the steam and electrified lines of the Illinois Terminal Railroad System. It is understood that Mr. Titus in his new position will assume the executive duties heretofore performed by D. W. Snyder, Jr., vice-president of the electrified lines, and H. H. Ferguson, vice-president of the steam lines of the Illinois Terminal Railroad System. His office will be in St. Louis.

Mr. Titus has announced the following appointments to the traffic department: H. G. Powell, general traffic manager, St. Louis, Mo.; H. A. Twohy, freight traffic manager, St. Louis, Mo.; E. L. Bodge, assistant freight traffic manager, St. Louis, Mo.; E. E. Kester, passenger traffic manager, Springfield, Ill.

Mr. Snyder is taking a five-week leave of absence, after which announcement of his future plans will be made public.

Mr. Titus has been in railway service for more than 36 years. He was born on April 11, 1875, on a farm near Princeton, N. J., and attended Princeton Preparatory School and Princeton College, entering railway service on July 1, 1890, in the car department of the Lake Shore & Michigan Southern (now part of the New York Central) at Cleveland, Ohio.

From 1893 to 1895 Mr. Titus was connected with a mining company in Mexico, then returned to the Lake Shore & Michigan Southern. In May, 1900, he was appointed car distributor and chief clerk to the superintendent of car service Wheeling & Lake Erie, being promoted to superintendent of car service at Pittsburgh, Pa., in November, 1905, to assistant superintendent at Canton, Ohio, in May, 1907, and later to superintendent at Canton.

He entered the service of the Alton in September, 1912, as general superintendent at Chicago. In November, 1915, he was further promoted to general manager, with headquarters at the same point, and in February, 1922, he was elected vice-president in charge of operation. When the Alton went into receivership Mr. Titus' title was changed to chief operating officer, with headquarters as before at Chicago.

A. G. Wadleigh Eastern Massachusetts Chairman

At the initial meeting on Jan. 15 of the new board of three public trustees of the Eastern Massachusetts Street Railway, Boston, Mass., Arthur G. Wadleigh, one of the number, was elected chairman of the board.

F. W. Woodcock Heads New Utility Company

Floyd W. Woodcock, who as vice-president of Day & Zimmermann has been in charge of public utility properties under their management for eight years, has been named president of the Empire Public Service Corporation, formed recently, as a new holding company controlling properties in Maryland, Ohio, Kansas, Louisiana, Oklahoma, Texas and Colorado with assets of $35,000,000. Mr. Woodcock was connected with the public utility management department of Day & Zimmermann in Philadelphia. Later he was named acting general superintendent of the Martinsburg Power Company, Martinsburgh, W. Va., and after a short association with that utility he was appointed general superintendent of the Eastern Shore Gas & Electric Company, Salisbury, Md. This position he held for four years, from 1916 to 1920. Mr. Woodcock is a member of the American Institute of Electrical Engineers, the American Electric Railway Association and other similar societies.

T. J. Hanlon, Chairman Florida Bureau

T. J. Hanlon, Jr., general manager of the Tampa Electric Company, Tampa, Fla., was recently made chairman of the Florida Public Utilities Information Bureau. Mr. Hanlon has been in the employ of Stone & Webster since he was graduated from college in 1907.

L. W. Hess Retires

L. W. Hess, general manager of the Northern Illinois group of properties of the Illinois Power & Light Corporation, has retired after 31 years of service. Mr. Hess has been identified with public utilities since 1898, when he was appointed receiver for the Ottawa Street Railway. When the bondholders, represented by E. H. Rollins & Sons interests, retrieved the property from the jurisdiction of the courts, he was appointed manager. Later he also became manager of the Thomas Light & Power Company, which was bought by the Rollins interests. In 1910 the combined property was bought by the Illinois Traction Company, later becoming a part of the Illinois Power & Light Corporation.

F. A. Fitzpane Succeeds R. S. Pilcher

F. A. Fitzpane, assistant transport manager of Edinburgh (Scotland) tramway and bus department, has been unanimously recommended by the transport committee of the Town Council for appointment to the post of general manager, succeeding R. S. Pilcher, who was recently appointed general manager of Manchester Tramways. Mr. Fitzpane has held a number of important appointments, notably the managership of Leith tramway undertaking. When, a few years ago, Leith was amalgamated with Edinburgh, he was appointed deputy transport manager of the combined undertakings of the two towns, and he collaborated with Mr. Pilcher in the change-over of the Edinburgh system from cable to electric traction.

C. D. Andrest, bus manager of the Citizens Rapid Transit Company, Newport News, Va., controlled by the Virginia Public Service Company, has resigned his position and on Feb. 1 became connected with the Omaha & Council Bluffs Street Railway, Omaha, Neb., as assistant to the vice-president in charge of transportation. Frank Hudson, the present superintendent of transportation at Omaha, will continue in that capacity.

Wray T. Thorn, formerly assistant engineer of cars and equipment of the Board of Supervising Engineers, Chicago Traction, and more recently with the Garford Motor Truck Company, Lima, Ohio, has become connected with Dwight P. Robinson in the work that organization is doing in connection with the proposed construction of the new subway in Buenos Aires, Argentine. Mr. Thorn served the Chicago board for more than ten years. His first experience in the electric railway industry was with the Union Traction Company of Indiana.

C. I. Crippen, a vice-president of the American Electric Power Corporation, New York, parent organization of the Iowa Public Service Company, the Sioux City Gas & Electric, and the Sioux City Service Company, has been elected president of the Iowa group. He succeeds Don M. Sterns, who retires as president to become chairman of the board of directors of the Iowa Public Service Company. Mr. Crippen served at one time as assistant to the vice-president and general manager of the Penn-Ohio System, covering all phases of operation.

W. Findlay Downs has been elected president of Day & Zimmermann, Inc., and Day & Zimmermann Securities Corporation. In this post he succeeds John E. Zimmermann, resigned. Mr. Downs' association with Day & Zimmermann, Inc., began in 1919 in the capacity of report engineer. Early in his career he was associated with the United Gas Improvement Company, Philadelphia, and later worked for the J. G. White Engineering Corporation. From 1915 to 1918, he served as assistant engineer of the Public Service Commission of Pennsylvania.

John Lee Gainey, Jackson, has been elected secretary of the Mississippi Railroad Commission, to fill the vacancy caused by the resignation of Paul D. P. Spearman, now attorney for the Federal Radio Commission.

OBITUARY

Samuel Wylie Miller, consulting engineer of the Union Carbide & Carbon Research Laboratories, Inc., of Long Island City, N. Y., well known as a pioneer in oxyacetylene welding and an authority on its application, died on Feb. 3 at his home on Long Island. His first professional activities were as master mechanic for the Pennsylvania Railroad plants at Logansport and Indianapolis, Ind., and Columbus, Ohio. Following this he was with the American Locomotive Company at Dunkirk, N. Y., and Providence, R. I., after which he founded the Rochester Welding Works at Rochester, N. Y. In 1921 he joined the newly formed Union Carbide & Carbon Research Laboratories, Inc. He was 62 years old.

Matthew Slush, builder of electric railways, died at his home in Mount Clemens, Mich., on Jan. 22. He constructed the interurban line from Kenosha to Milwaukee, Wis., which later became a unit of the Chicago, North Shore & Milwaukee Electric Railway. He also assisted in building other lines of the kind, among them the Mount Clemens, Lake St. Clair Shore Line, Fort Wayne & Huntington, Ind.; Detroit Toledo Line, and Chicago to Kankakee, Ill. Mr Slush was born in Ontario in 1856 and went to Michigan when he was sixteen years ago. After a successful career in the lumber industry, he then turned his attention to electric railways.

Thomas Riedy, for 57 years an employee of the Chicago Surface Lines, Chicago, Ill., died recently. He began his services with the railways in Chicago in 1872 at the Western Avenue carhouse. Later he was promoted to the position of supervisor. The last few years he was attached to the general offices. Mr. Riedy was born in Ireland 73 years ago.

Harold B. Whiteman, assistant to the vice-president Allied Power & Light Corporation, died on Feb. 1. Mr. Whiteman in the five years following his graduation from Amherst College in 1912 was employed by the Columbus Railway Light & Power Company, Columbus, Ohio, and Chattanooga, Tenn.; the East St. Louis Railway & Suburban Company and the Nashville Railway & Light Company, becoming secretary-treasurer of the Nashville Company. In August, 1917, he became assistant general superintendent Chattanooga Railway & Light Company. In 1920 he was also made assistant general superintendent Tennessee Power Company, retaining this position with the Tennessee Electric Power Company upon its organization in 1922. Two years later he became commercial manager and subsequently was called to New York to assume executive duties with Hodenpyl, Hardy & Company, which last year was succeeded by the Allied Power & Light Corporation.

Large Track Construction Programs Are Planned

International Railway, Buffalo, N. Y., will spend $1,000,000 for track reconstruction during 1929. $634,500 Improvement planned for Minneapolis. 150 New subway cars recommended for Brooklyn

RECONSTRUCTION of track amounting to more than $1,000,000 will be made by the International Railway, Buffalo, N. Y., during the year 1929. This program was agreed upon recently at a conference of representatives of the railway and members of the Common Council. The actual track reconstruction and repaving will amount to approximately $630,000, and the general maintenance cost will be about $400,000.

The program calls for track construction and repaving on Seneca Street from Main to Michigan Streets, and from New Bailey to Peabody Street on William Street; from Babcock to the Erie Railroad tracks on Virgil Street and, also on Virgil Street, from Tacoma to Taunton Street; on Clinton from Michigan to Pine Street; on Clinton from Cedar to Jefferson; on Fillmore from Genesee to Seneca; on Swan from Washington to Ellicott and from Jefferson to Seneca Streets; on Erie from Main to the lower Terrace, and on Ferry Street from Jefferson to Fillmore.

This program agreed upon will bring the total amount expended by the International Railway in the past three years up to $2,500,000. Of the $1,000,000 appropriation for this year more than half will be spent for reconstruction, which is 70 per cent more than last year and 150 per cent more than two years ago. The company will build about 10 miles of single track and paving. The tracks and paving at several important intersections will be renewed in whole or in part.

The largest construction job will be on Fillmore Avenue, which is the approach to the new New York Central Terminal. This construction will cost more than $250,000. Although a number of other construction jobs were suggested by the city, this work must be deferred until more money becomes available. Work on the present reconstruction program will be commenced as soon as favorable weather arrives.

Minneapolis Improvements

The budget for proposed improvements in 1929 by the Minneapolis Street Railway, Minneapolis, Minn., includes track relaying and renewals costing approximately $634,500. The program calls for reconstruction on East Hennepin Street from Fifth Street to the Missouri River to cost $21,950, relaying of tracks on University Avenue to cost $80,000, relaying of tracks on Tenth Avenue and on West Broadway to cost $75,900, and the relaying of tracks on Hennepin Avenue from Seventh Street to Eleventh Street to cost $32,200. Reconstruction is planned on Nicollet Avenue from Eighteenth Street to 24th Street, to cost approximately $30,000, and on Glenwood Avenue at a cost of about $9,200. Special work at Hennepin Avenue and Third Street will cost $29,000, and paving between the tracks on several additional lines will cost about $86,800. New work on tracks on Washington Street between Seventeenth and Nineteenth Avenues will cost $18,000, and another relaying job will amount to about $30,470. Extension of the 28th Avenue line from 50th to 54th Streets will amount to $21,000, and the Como-Harriet line on France Avenue, between 50th and 44th Streets, will cost about $33,600. In addition, an outlay of approximately $166,400 will be made for general purposes. This amount will be prorated between thirteen wards, each being credited with about $12,800.

Cars for Brooklyn

Commissioner Lockwood of the New York Transit Commission has received testimony on the proposal of the commission to have the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., purchase additional equipment and furnish improved service during the non-rush hours. The engineers of the commission consider that it will be necessary to add 150 new cars in the Brooklyn subway system to speed up the service. As for non-rush hour service, the engineers have recommended that the railway be required to run full-length trains during these periods.

During this year most of the appropriations of the $7,000,000 improvement program of the Georgia Power Company, Atlanta, Ga., will be spent on the

Chicago to Order 100 New Cars



The new cars will be the first of the front-entrance, center-exit type placed in service in Chicago

Chicago Surface Lines, Chicago, Ill., will soon purchase 100 new single-end, double-truck, city type passenger cars. As mentioned in the Jan. 19 issue of Electric Railway Journal, the Chicago Railways authorized the purchase of 60 of these cars, and the Chicago City Railway authorized the purchase of the remaining 40. In accord with the program for higher scheduled speed being carried out by this company, these cars will be equipped with sufficient motor power to give quick acceleration and high running speeds. Each of these two-man cars will seat 60 passengers.

Departing from the usual practice, these cars will be the first front-entrance, center-exit type to be placed in service in that city. To facilitate the loading and unloading of passengers in these large units, double and single folding entrance doors are provided in the front end, and double and single sliding type exit doors are installed in the center of each car. A light color interior painting scheme will be used instead of the usual mahogany stain. In the rear section of the car cross-type seats will be employed. In the front end, cross seats will be installed on one side and longitudinal seats on the other thus expediting the movement of passengers from entrance to exit. All seats will be fully upholstered in leather.

street railways in Atlanta as the Macon, Rome and Athens Street Railway Systems have been overhauled recently. Some of the money, however, will go to other cities where street railway lines are operated.

According to word received recently, plans for the proposed extension of the Hill Street Tunnel of the Pacific Electric Railway, Los Angeles, Cal., to Glendale Boulevard and Riverside Drive are being made by the New York office of this railway.

In two bills passed by the City Council of Seattle, Wash., extensions of the Beacon Hill street car line are provided for. One bill allows for a $28,100 extension from Spokane Street to Columbian Way, and the other for the extension of Columbian Way to Graham Street, at a cost of about $27,900. Residents of this district have been requesting this extension for some time.

The Illinois Terminal Railroad will construct nine new locomotives at its Decatur shops. Five small electric locomotives of the class O type are being built at the present time, and work on four of the large class C engines is scheduled to start on Feb. 1. The large locomotives will be used in regular train service and the smaller engines will be used in switching and pulling small work trains. The large locomotives weigh approximately 150,000 lb. each and generate 1,000 hp., giving a pull of more than 40,000 lb. It is estimated that they will cost approximately $50,000 each. The smaller type locomotives, costing approximately $20,000 each, will weight about 80,000 lb. and develop 250 hp.

The Key System Transit Company, Oakland, Cal., has ordered ten urban type Twin Coaches. Three of this type of coach have been ordered by the Detroit Street Railways and four of the same type have been purchased by the Jacksonville Traction Company, Jacksonville, Fla. The United Electric Railways has ordered nine suburban express type Twin Coaches.

Cars Remodeled

Thirty cars are being remodeled for one-man operation by the Duluth Street Railway, Duluth, Minn. In connection with this work this company has purchased 30 sets of front and rear pneumatic door controls, 30 sets of safety equipment and 30 sets of leather upholstered seats for remodeling the cars. This company has also purchased 5 miles of No. 00 round trolley wire.

The Virginia Electric & Power Company, Richmond, Va., has placed orders for ten kegs of 1x5-in. track bolts, five kegs of ¾x5-in. track bolts and 80 kegs of track spikes. This company also ordered 500 rail bonds, 35 tons of 98-451 steel rail and 30 tons of section 132-443 steel rail. Among line materials ordered by this company are included 700 trolley cars, 350 trolley suspension clamps, 30 trolley section insulators and six trolley frogs. For handling coal at its Twelfth Street plant this railway has purchased one 43-ton locomotive from the Equipment Corporation of America, Philadelphia, Pa. This company has also purchased five urban type Twin Coaches. Six of this type of coach have been purchased by the Northern Ohio Power & Light Company, Akron, Ohio, and one by the Houston Electric Company, Houston, Tex.

Turnstile Equipped Car Tried in Brooklyn

A surface car with equipment adapted to the subway method of fare collection by automatic turnstile was placed in service recently for experimental operation on the Vanderbilt Avenue line of the surface lines of the Brooklyn-Manhattan Transit Company, Brooklyn, N. Y.

The car is designed for front entrance, with exit facilities at both the front and read. Passengers boarding



The car is equipped with an automatic fare collection turnstile

the car pass behind the operator to a turnstile just inside the body. The turnstile is of the mechanical type with revolving arms and is manufactured by the Perey Manufacturing Company. The turnstile operates with less noise than those used at subway stations and is of lighter construction. The slot in which the coin is deposited is situated at the corner of the machine handiest to the entering passenger. The operator is provided with fare tokens to be given to passengers who board the car with transfers, so that they may also pass through the turnstile, which is constructed so that either a fare token or nickel will release the mechanism and admit passengers.

Modern type safety devices have been installed in the new unit. The doors are operated by pneumatic engines, which are interlocked with the operation of the motorman's brake valve. The rear exit doors are treadle operated and are also interlocked with the brake valve, so that they will function only when the car is stopped. The controller is the "dead man" type.

Longitudinal seats and a wide center aisle permit passengers readily to move through to the rear exit. Enameled handhold rails extend the entire length of the car on each side, suspended at a convenient height, and take the place of the old straps provided for standing passengers. As a protection for alighting passengers and reminder to drivers of approaching automobiles the words "Obey the 8-Foot Law" are painted on both ends of the car close to the exit doors.

To Have Exhibit Days at Convention

Due to the general success during the several previous conventions in setting aside one day during the convention week for the intensive inspection of exhibits by operating members, the American Electric Railway Association executive committee, at its meeting in Indianapolis on Jan. 25, resolved that, at the coming convention to be held in Atlantic City, Monday afternoon and Wednesday morning of the convention week are to be devoted exclusively to the exhibit inspections, and requested that no meetings of any kind be scheduled during those periods.

At this meeting, the executive committee expressed its appreciation of the co-operation during previous conventions, upon the part of the manufacturers in abstaining from demonstrating operating equipment, staging exhibits in hotel rooms and other places away from the exhibit halls, and inviting delegates to their demonstrations and exhibits. It has requested the continuation of the manufacturers' support in this matter.

Electrical Manufacturers Revise Constitution

The revised constitution and by-laws just passed by the National Electrical Manufacturers Association marks a new departure in association management. The outstanding feature of the constitutional revision is the creation of a council of the chairmen of all groups in the N.E.M.A. In the new section council the leaders of the individual groups, both sections and divisions, will be able to accelerate and render their efforts more efficient through the closer relationship with the board of governors to which they will annually elect nine of their number. In view of the fact that all association activities originate in the groups, which are now represented on the governing body, an astonishing degree of mobility has been obtained.

The revised constitutional set-up also provides for the regrouping of sections into new divisions in which it is believed that a closer and more effective degree of co-operation can be obtained by the individual sections thus organized. A new divisional grouping has been suggested and is at present being considered by the sections. Final approval of this regrouping will probably be given at the time of the spring meeting and will then become effective.

By decreasing the number of meetings from six to three each year, the association believes that approximately $300,000 will be saved annually to the membership. The annual meeting of the association will be held in the fall instead of the spring as heretofore. In addition, two other meetings of the association may be held each year.

Westinghouse Enlarges Advertising Activities

Significant of its extensive effort to sell the idea of the Westinghouse institution as a leader in the development of the electrical industry, the Westinghouse Electric & Manufacturing Company has announced a considerably larger advertising program for 1929. This increase in advertising will be made in technical, trade and business publications, as well as in the daily newspapers, according to the plan stated before the McGraw-Hill editors and business executives in a recent meeting with J. C. McQuiston, general advertising manager for the company. Rotogravure advertising in Sunday newspapers will be resorted to on a large scale in 35 metropolitan centers throughout the country, supported by newspaper advertising in other papers. Advertising of all types will be co-ordinated for each of the metropolitan areas.

A major feature of this program is a definite tie between advertising and sales efforts of the company. It is an impressive program, first started two years ago, that has resulted in making the Westinghouse organization "advertising conscious," according to Mr. McQuiston. The entire campaign is to be based first, on the development of community markets for merchandise equipment through newspaper advertising; second, on the development of industrial and trade markets through business and technical paper advertising; and, finally, to co-ordinate and time all advertising to suit the seasonal and territorial demands.

The list of business and technical magazines selected by the company is well over 150, covering practically every American industry. In addition, as in the past, the leading state farm papers will be used for such advertising as is applicable to the rural community. Financial publications will also be utilized.

In addition, reprints of important technical magazine articles and several descriptive leaflets on apparatus will be available, presenting a complete line of literature on any subject needed. Aside from the regular schedule of trade paper advertising, in which advertisements will be alternated on oil-electric, gas-electric and electric locomotives, a special series of electrification advertisements will be run this year.

This extensive group plan of advertising, to be promoted in large centers of population and made increasingly effective by a saturation of the surrounding territories through local mediums, will be backed up by an increased presentation in technical and trade publications. With the intimate co-operation and enthusiasm of its sales force, this plan should be of particular value to the electric railway industry in its present trend toward modernization.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	Feb. 5, 1929
Metals—New York	
Copper electrolytic, cents per lb.	16.275
Copper wire, cents per lb.	19.375
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	50.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	0.975
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.75
Weatherproof wire base, N. Y., cents per lb.	20.375
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25
Turpentine (bbl. lots), N. Y., per gal.	.645

New Electric Railway for Japan

One of the most important developments since the earthquake will be undertaken in the city of Yokohama, Japan, according to plans which are now under consideration.

It is reported that Ryosaku Kume, of Tokyo, and twelve other promoters are planning a new electric railway to run around the city of Yokohama. The company has already applied for a license and will be known as the Yokohama Junkan Denki Tetsudo K.K. to be capitalized at 3,500,000 yen, approximately $1,662,000. The projected line will start from the New Yokohama Station and terminate at Isogo Machi, via Hodagaya Machi, Kusaka Mura and O-oka Mura, approximately 5 miles.

Waste Elimination Supported

That the individual is taking a greater interest in the work of the U. S. Department of Commerce in assisting American industry to eliminate waste, through simplification and standardization, is evidenced in a report just made public by the Department reviewing the progress report of this group for the 4th quarter of 1928.

According to this report, the number of acceptances for simplified practice recommendations increased during the quarter from 12,342 to 14,190. During the calendar year 1928 the total number of acceptances increased from 8,546 to 14,190. During 1928 industry developed 22 new simplifications, under the auspices of the Department. There are more than 100 effected simplified practice recommendations.

After a proposed simplification is approved at a general conference of interested manufacturers, distributors and users, it is then sent to the industry for signed acceptance. When the division of simplified practice has received signed acceptance pledges from at least 80 per cent of the industry, by volume of annual output, the recommendation is then endorsed and published by the Department of Commerce. These recommendations are subjected to periodical review or audit, which not only gives the industry concerned an opportunity to determine the support given its program, but also the opportunity to revise or modify it, if changes in the industry so warrant.

Of the more than 100 developed simplified practice recommendations, 89 have received sufficient endorsement from industry to warrant the Department publishing them, of which number 84 are already in print.

Booklet Describes British Electric Locomotives

In view of the recent order received by the Metropolitan-Vickers Electrical Company, Trafford Park, Manchester, England, for 21 additional electric locomotives for the Great Indian Peninsula Railway, special interest is attracted to an illustrated book just issued by the Metropolitan Vickers Company. This publication gives particulars of various types of electric locomotives supplied to the Great Indian Peninsula Railway, the South African Railways, the North Eastern Railway (England), the Metropolitan Railway (England), the Paulista Railway (Brazil), the Oeste de Minas Railway (Brazil), the Government of Western Australia, the Japanese Government Railways, the Broken Hill Proprietary Company (Australia), and the Czecho-Slovakian State Railways.

As a preliminary to the details in regard to each type of locomotive, there is a useful introduction in which the electric locomotives are described. Besides being illustrated by photographs, the book contains a number of drawings.

Cutler-Hammer Changes Name

Announcement has been made of a change in the name of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., manufacturer of electric motor control, wiring devices and allied lines. The new name of the company will be Cutler-Hammer, Inc.

The new company is organized as a Delaware corporation with the following officers:

Chairman of the board, F. R. Bacon; president, B. L. Worden; vice-president, F. L. Pierce; vice-president, J. C. Wilson; treasurer, H. F. Vogt; secretary, W. C. Stevens.

In the change from a Wisconsin to a Delaware corporation the Cutler-Hammer Manufacturing Company, Milwaukee, the Cream City Foundry Company, Milwaukee, and Cutler-Hammer Manufacturing Company, New York, are united under one name.

When better hand brakes are made . . .



we expect you will specify them. But while Peacock Staffless Brakes are still the best brakes on the market, we strongly recommend that you adopt Peacocks for your old cars as well as for your new.

PEACOCK STAFFLESS BRAKES



have several outstanding features that justify this claim.

In the first place, they are ideally adapted to modern car design, for they are light in weight (only 72 lbs.) and occupy very little platform space. Secondly, they are extremely fast in emergency. They wind up the chain with lightning speed. A very necessary accomplishment where the time element is all important.

Thirdly, they actually stop the car, and stop it quickly, for they enable the motorman to exert a pressure of 3000 lbs. without undue effort. And they do this in spite of slack rigging and worn brake shoes, for they take up *all* the chain and never clog.

And last but not least, they require very little maintenance throughout their long life. For Peacocks are ruggedly built with few parts. And the wearing parts are made easily and inexpensively replaceable.

NATIONAL BRAKE COMPANY, Inc.

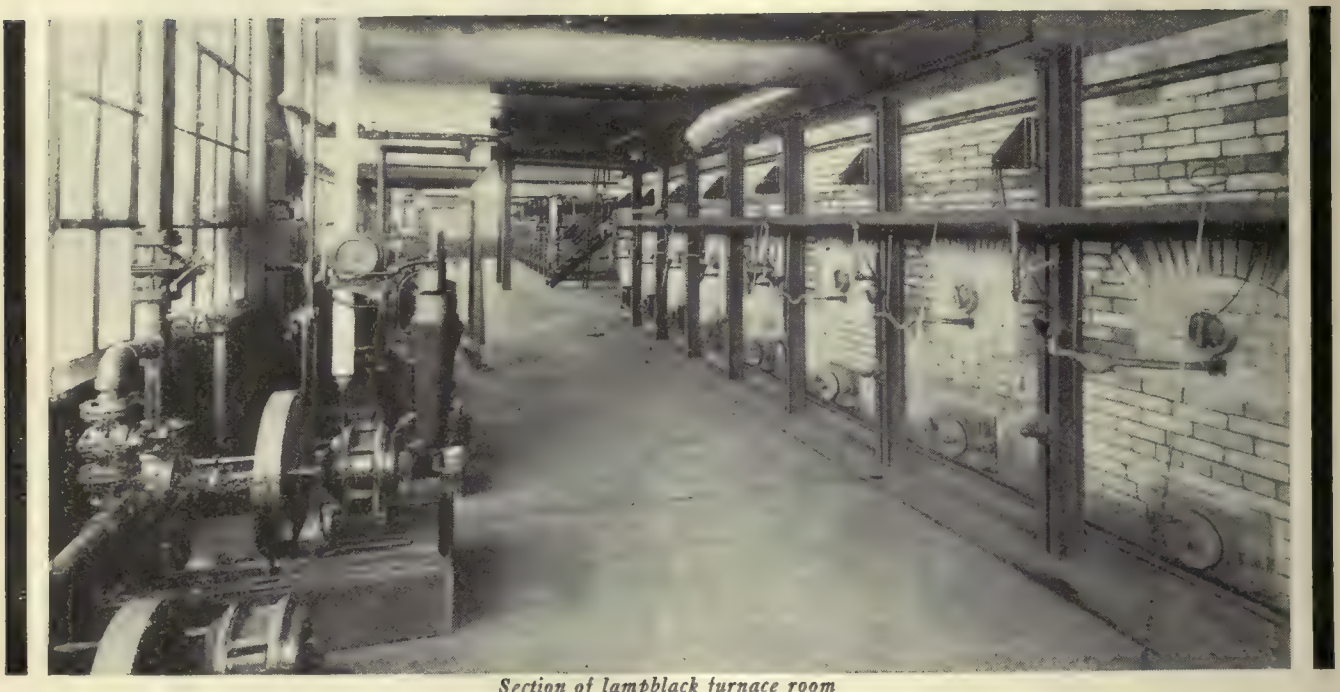
890 Ellicott Square, Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.
General Sales Representatives: The Ellcon Co., 50 Church St., New York

◆◆ BEHIND THE PYRAMIDS—2 ◆◆

N C C

We manufacture our own LAMPBLACK



Section of lampblack furnace room

THE largest single basic material in most high grade carbon brushes is lampblack, for this is almost pure carbon. Lampblack being used by many industries, including rubber and paint, it is a staple article of commerce and can be bought freely on the open market from firms who make a business of burning it from oils and oil wastes, natural gas and other fuels that are rich in carbon.

Instead of buying lampblack, we manufacture our own. Only by doing so can we be assured of lampblack of sufficiently high purity for use in making National Pyramid Brushes.

We first purchase oil, buying it to strict specifications, and testing each tank car lot to make sure it meets those specifications. This oil is then burned in a special furnace, under such carefully controlled conditions of temperature and oil and air supply as will liberate most of the carbon in the oil. The draft from the furnace chamber goes through many large settling chambers, to give the fine, fluffy lampblack time to settle.

Before any of this lampblack can be used, it is tested in our laboratory for volatiles and for ash. To be good enough for National Pyramid Brushes, it must not contain more than a trace of volatile matter, and a few hundredths of one per cent of ash. Thus closely is governed the purity of the carbon and its suitability for the brushes you buy bearing the Pyramids and the Silver Strand Cable. When you use National Pyramid Brushes you are sure of a brush of the highest efficiency due to such painstaking care in manufacture.

NATIONAL CARBON COMPANY, INCORPORATED

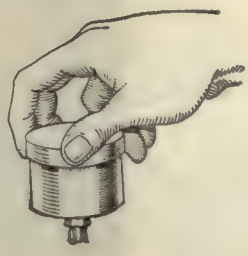
Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division

Cleveland, Ohio — SILVER STRAND CABLE TRADE-MARK REGISTERED — San Francisco, Cal.

Branch Offices and Factories

Chicago, Ill. Pittsburgh, Pa. Jersey City, N. J. Birmingham, Ala.



Pressure Lubrication Involves more than this Now-a-days!

Pressure lubrication, in the old days, meant giving a few turns to the caps of the grease cups—and trusting that the lubricant would get to the spot required.

Now-a-days, with speeds and pressure far different than what they used to be, more positive means of oil or grease application are required.

Consequently, industry has turned extensively to mechanical pressure lubrication.

With this change, the human element in regulating lubricating pressures has been largely eliminated; but the necessity for alertness in the *kind* and *amount* of lubricant to use has been increased.

We speak with authority on this subject. We have studied it extensively; and much of our information is the result of actual experience on machinery within our own plants and throughout plants of thousands of satisfied TEXACO customers.

We can furnish you a time-tested TEXACO Lubricant that will work most effectively and economically on any system of pressure lubrication you are using.



The December 1928 issue of the magazine, "LUBRICATION;" is devoted entirely to the subject of Pressure Lubrication. We shall be glad to send you a copy and put you on the free mailing list to receive "LUBRICATION" monthly. Write to the address below.

THE TEXAS COMPANY

Texaco Petroleum Products

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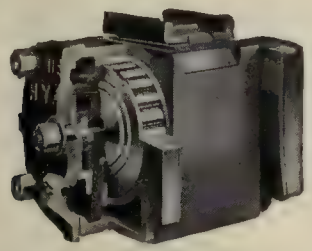
INTERURBAN roads, benefiting by the experience of many leading street railways, are fast replacing plain brass journals with friction-free Hyattized equipment.

The true rolling motion of Hyatt bearings makes possible quicker starts and smoother running without the customary exorbitant increase in power.

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Girder Rails, Special Trackwork, Switches, Frogs and Crossings in Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail

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COLUMBIA 18 92 MACHINE WORKS

COLUMBIA

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These registers with B-10 horizontally operating backs and B-9 vertically operating backs are almost new. Most of them have been in service less than a year and none more than 2½ years. All are in first-class operating condition.

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ENGINEER—Ways and structures; 9 years' experience with street railway and interurban property. Clean, successful record, high-grade references, seeking position with future. PW-161, Electric Railway Journal, Tenth Ave. at 36th St., New York.

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the rolling stock or equipment that you are not using.

Sell it

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Priced to Move Quickly
Also Johnson Type D Fare Boxes
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Brill Co. The J. G.
Cincinnati Car Co.

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Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Columbia Machine Works
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.

Generators
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General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grease
Texas Co., The

Grinders & Grinding Supplies
Metal & Thermit Corp.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Guard Rail Clamps
Lorain Steel Co.
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
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Wm. Wharton, Jr. & Co.

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Elec. Service Supplies Co.

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Columbia Machine Works
Elec. Service Supplies Co.
Star Brass Works

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Elec. Service Supplies Co.
General Electric Co.

Headlining
Columbia Machine Works

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Consolidated Car Heating Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car Stove
Smith Heater Co., Peter

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Railway Trackwork Co.
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Westinghouse Tr. Brake Co.

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Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co.
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Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co
General Electric Co.
Westinghouse E. & M. Co.

Jacks (See also Cranes, Hoists and Lifts)
Columbia Machine Works
Elec. Service Supplies Co.

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(See Rail Joints)

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Brill Co., The J. G.
Cincinnati Car Co.

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Westinghouse E. & M. Co.

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Nichols-Lintern Co.

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Nichols-Lintern Co.

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Cincinnati Car Co.

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Electric Service Supplies Co.

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Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Diesel Electric
American Brown Boveri Electric Co.

Locomotives, Electric
American Brown Boveri Electric Co.
Cincinnati Car Co.
General Electric Co.
Westinghouse E. & M. Co.

Lubricants
Texas Co., The

Lubricants, Oils and Greases
Texas Co., The

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr., & Co.

Manganese Steel Castings
Bemis Car Truck Co.
Lorain Steel Co.

Manganese, Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.

Manganese Steel Switches Frogs and Crossings
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Mica
Mica Insulator Co.

Mirrors, Inside & Outside
Cincinnati Car Co.

Motor Buses, (See Buses)

Motor & Generator Sets
American Brown Boveri Electric Co.

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.

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Cincinnati Car Co.
Elec. Service Supplies Co.

Nuts and Bolts
American Steel Foundries
Bemis Car Truck Co.
Cincinnati Car Co.

Oil
Texas Co., The

Omnibuses (See Buses)

Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Tr. Brake Co.

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Elec. Service Supplies Co

Paints & Varnishes, Railway
National Ry. Appliance Co.

Paving Material
American Brake Shoe & Found. Corp.

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Pinions (See Gears)

Pins, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Pins, Case Hardened, Wood and Iron
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Westinghouse Tr. Brake Co.

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Standard Steel Works
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Supplies Co.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.

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Elec. Ry. Equipment Co.

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Bell Lumber & Pole Co.
Intern. Creos. & Const. Co.

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Poles, Trolley
Elec. Service Supplies Co.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

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Okonite Co.
Okonite-Callender Cable Co., Inc.

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National Ry. Appliance Co

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Cincinnati Car Co.

Pressure, Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

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International Reg. Co., The

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Illinois Steel Co.
Rail Joint Co.

Rail Joints, Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Corp.
Una Welding & Bonding Co

Rails, Steel
Carnegie Steel Co.
Illinois Steel Co

Railway Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co
Elec. Service Supplies Co
Hale-Kilburn Co.

Rectifiers Mercury Arc Power
American Brown Boveri Electric Co.

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Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
International Reg. Co., The

Reinforcement, Concrete
Bethlehem Steel Co.

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Elec. Service Supplies Co

Repair Work (See also Coils)
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Replacers, Car
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Cincinnati Car Co.
Elec. Service Supplies Co.

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Consolidated Car Htg. Co.
General Electric Co.

Resistance, Wire and Tube
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Safety Control Devices
Safety Car Devices Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
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Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.

Sash, Metal Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers Track)

Screw Drivers, Rubber Insulated
Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

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Gerke, G. W.
International Railway Co.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

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Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting
Consolidated Car Htg. Co.
Elec. Service Supplies Co
National Pneumatic Co.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Elec. Service Supplies Co.
Nachod and United States Electric Signal Co.

Signal Systems, Highway Crossing
Nachod and United States Electric Signal Co.

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Anderson Mfg. Co., A. & J.
Cincinnati Car Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

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Nichols-Lintern Co.

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National Ry. Appliance Co

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Brill Co., The J. G.
Columbia Machine Works

Snow Sweeper, Rattan
J. G. Brill Co.

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Lorain Steel Co.
Wm. Wharton, Jr. & Co.

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Illinois Steel Co.

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Westinghouse E. & M. Co.

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Mahon Co., R. C.

Springs
National Ry. Appliance Co.

Springs, Car and Truck
American Steel Foundries
Bemis Car Truck Co.
Brill Co. The J. G.
Cincinnati Car Co.
Standard Steel Works

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Brill Co., The J. G.

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American Steel Foundries
Timken Roller Bearing Co.

Steel, Open Hearth
American Steel Foundries
Timken Roller Bearing Co.

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American Steel Foundries
Carnegie Steel Co.
Illinois Steel Co.

Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Anderson Mfg. Co., A. & J.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Strand
Roebling's Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express)

Structural Steel
American Brown Boveri Electric Corp.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches
American Brown Boveri Electric Corp.
General Electric Co.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo-Ajax Corp.

Switches, Track (See Track Special Work

Continued on page 38



Boyerized Parts:

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Turnbuckles
Case Hardened Bushings
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
Manganese Brake Heads
Manganese Truck Parts
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McArthur Turnbuckles
Trolley Pins

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J. H. Denton,
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Bemis Car Truck Company
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WM. WHARTON JR. & CO., INC.
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Bethlehem Products for Electric Railways

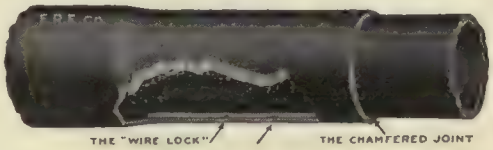
Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Forged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

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BETHLEHEM

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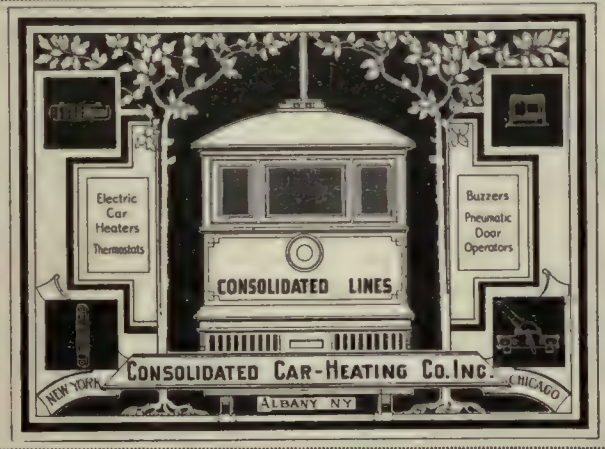


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Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

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The Ideal Insulation for Electric Railways

INSULATED WIRES and CABLES
OKONITE, MANSON and DUNDEE TAPES

POWER CABLES, SIGNAL CABLES and CAR WIRING

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THE OKONITE-CALLENDER CABLE CO., INC.
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Okonite Quality Standards Unchanged for Half a Century



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CHANGE CARRIERS, TOKENS

The DIFFERENTIAL CAR



Standard on 60 Railways for

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Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Materials
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Use These Labor Savers

Differential Crane Car
Clark Concrete Breaker
Differential 3-way Auto Truck Body
Differential Car Wheel Truck and Tractor

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.

ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Page

—A—

American Brake Shoe & Foundry Co. 31
American Brass Co., The..... 31
American Brown Boveri Electric Corp. .....Front Cover
American Car Co.....Third Cover
American Steel Foundries 6
Anaconda Copper Mining Co... 31
Anderson Mfg. Co., A. & J.... 35

—B—

Beeler Organization 30
Bell Lumber & Pole Co..... 31
Bemis Car Truck Co..... 37
Bethlehem Steel Co..... 37
Bibbins, J. Rowland 30
Brill Co., The J. G....Third Cover
Buchanan & Layng Corp..... 30

—C—

Carnegie Steel Co..... 27
Cleveland Far Box Co..... 37
Collier, Inc., Barron G..... 26
Columbia Machine Works..... 32
Consolidated Car Heating Co.. 37

—D—

Differential Steel Car Co., The.. 37
Dodge Bros. .....Insert 11-14

—E—

Electric Ry. Equipment Co.... 37
Electric Service Supplies Co... 9

Page

—F—

Faile & Co., E. H..... 30
Ford, Bacon & Davis..... 30
"For Sale" Ads..... 33

—G—

General Electric Co..... 22
Griffin Wheel Co..... 35

—H—

Hale-Kilburn Co. 19
"Help Wanted" Ads..... 33
Hemphill & Wells 30
Holst, Englehardt W..... 30
Hyatt Roller-Bearing Co..... 29

—I—

Illinois Steel Tie Co..... 8
International Creosoting & Construction Co. 10
International Register Co., The. 35
International Steel Tie Co..... 7

—J—

Jackson, Walter 30
Johnson Bronze Co..... 20
Johnson Fare Box Co..... 35

—K—

Kelker, DeLeuw & Co..... 30
Kuhlman Car Co.....Third Cover

—L—

Lorain Steel Co..... 32

—M—

Mahon Co., R. C..... 16
Master Plier Corp..... 31

Page

McClellan & Junkersfeld 30
Metal & Thermit Corp..... 18
Mica Insulator Co..... 28

—N—

Nachod and U. S. Signal Co.... 31
National Brake Co., Inc..... 23
National Carbon Co..... 24
National Pneumatic Co..... 15
National Ry. Appliance Co..... 35
Nichols Lintern Co..... 31

—O—

Oakite Products, Inc..... 32
Okonite-Callender Cable Company, Inc., The..... 37
Okonite Co. The..... 37

—P—

Perey Mfg. Co., Inc..... 31
Positions Wanted and Vacant... 33

—R—

Rail Joint Co..... 31
Railway Track-work Co..... 31
Railway Utility Co..... 31
Ramapo Ajax Corp..... 31
Richey, Albert 30
Roebling's Sons Co., John A... 31

—S—

Safety Car Devices Co..... 5
Sanderson & Porter..... 30
Searchlight Section 33
Smith Heater Co., Peter..... 31
Standard Steel Works Co..... 21

Page

Star Brass Works 35
Stevens & Wood, Inc..... 30
Stone & Webster 30
Stucki Co..... 31

—T—

Texas Co., The..... 25
Timken Roller Bearing Co..... 17

—U—

Una Welding & Bonding Co... 31

—W—

"Want" Ads 33
Wason Mfg. Corp.....Third Cover
Waukesha Motor Corp..Back Cover
Westinghouse Air Brake Co.... 4
Westinghouse Elec. & Mfg. Co. Second Cover
Wharton, Jr. & Co., Inc., Wm.. 37
"What and Where to Buy," 34, 36, 38
White Eng. Corp., The J. G... 30
Wish Service, The P. Edw..... 30

SEARCHLIGHT SECTION

Classified Advertising

Classification	Page
BUSINESS OPP.	33
EMPLOYMENT	33
USED AND SURPLUS EQUIPMENT	33
Gerke, G. W.	33
International Railway Co.	33

WHAT AND WHERE TO BUY—Continued from page 36

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Lorain Steel Co.
Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Telephone & Telegraph Wire
John A. Roeblings Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.)

Thermostats
Consolidated Car Htg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Tie Plates
Illinois Steel Co.

Ties & Tie Rods, Steel
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles Ties, Posts, etc.)

Tokens
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Railway Trackwork Co.
Una Welding & Bonding Co.
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Welding, Steel
Railway Trackwork Co.
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Welding Wire
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Wheel Presses (See Machine Tools)

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Griffin Wheel Co.

Wheels, Car, Steel & Steel Tire
American Steel Foundries
Bemis Car Truck Co.
Carnegie Steel Co.
Illinois Steel Co.
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Columbia Machine Works
Elec. Ry. Equipment Co.
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Star Brass Works

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Brill MASTER UNIT Cars embody the proven principles of construction that are known to be fundamentally sound. Present day standards of appearance, comfort, and operating economies as well as uniformity of design have been applied. The result is a new series of cars that leave little to be desired in the way of mass transportation vehicles for every type of electric railway service.

The single-end, center-exit car for city service illustrates another type in the MASTER UNIT series. There is no need to experiment with this type car.

Write for detailed information.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G. C. KUHLMAN CAR CO. CLEVELAND OHIO — WASON MANF'G CO. SPRINGFIELD, MASS.

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Fageol Truck Model 10-66 *and Trailer Powered by Waukesha* 6*AB Engine*

153 TON-MILES per GAL.

FROM Oakland to Salina, California, is a distance of 104 miles—a trip which the Fageol six-wheel tank truck and trailer covers in 4 hours, 25 minutes elapsed time. The Waukesha Engine which powers the truck gives from 4¼ miles to 4½ miles per gallon of gasoline consumed, with a gross load of 68,000 pounds or 153 ton-miles per gallon of gasoline. The equipment is owned by the Golden Gate Motor Transit Co., which operates it in the service of the General Petroleum Co.

Whether you want a gasoline engine for automotive or industrial service, there is a Waukesha four or six-cylinder unit that just suits the job. Write for Bulletin 710—"What's New with Waukesha."

910

AUTOMOTIVE EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY

New York Tulsa **Waukesha, Wisconsin** Houston San Francisco

Exclusive Builders of Heavy-Duty Internal Combustion Engines for Over Twenty Years

MAINTENANCE AND CONSTRUCTION ISSUE

ELECTRIC RAILWAY JOURNAL

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1929

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THE BASE OF MODERNIZATION



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1929
Advertising Index—Alphabetical, 44; Classified, 40, 42, 44; Searchlight, 39

Vol. 73, No. 7 *Pages 269–308*

February 16, 1929

In This Issue

Editorials 269

A Race Against Time—Digging Below the Surface—Heavy Inspection as a Means of Cutting Costs—Specifications for Special Trackwork Approved—Philadelphia Looks Ahead in Planning Its Subway—The Subsidy as a New Shibboleth.

Special Inspection Increases Shop Efficiency 272

BY CLARENCE W. SQUIER

In the Coney Island Shops of the Brooklyn-Manhattan Transit Corporation a force of inspection specialists has been built up by concentrating the work of inspecting subway cars.

Reducing Costs of Armature Rewinding 280

BY A. C. ROE

Correctly shaped high grade materials, proper insulation and reinforcement are described by the author as vital points in successful armature rewinding.

Shallow Steel Tie Construction Used in Flint and Pontiac 283

Numerous economies were effected in the original cost, speed of construction, paving surface and durability of this track installation employing a shallow type steel tie.

Prolonging the Life of Electric Railway Armatures 289

BY R. S. BEERS

Care in the selecting and annual application of insulating varnish and in the method of banding are given as important factors in prolonging armature life.

Winners of First Group of Department Prizes in Maintenance Contest 278

Maintenance Data Sheets 285

Louisville Improves Its Safety Record 291

Maintenance of Aluminum Cell Lightning Arresters 292

Ideas for Better Maintenance 293

Turntable for Heavy Field Coils—Portable Pit Oven for Limited Space—Useful Air Equipment Tools

Improved Equipment Suggestions 294

Brake Rod Turnbuckle—Accessories for Pressure Lubrication—Sleeve for Reinforcing Poles—Improved Welding Gloves—Earth Boring Machine for Pole Setter

News of the Industry 295

Fare Increase Sought in Louisville—Traffic Problem Before U. S. Chamber—Private Auditing Firm Finds Detroit Net Revenue $1,265,180 Less Than Amount Required—Consolidation of Surface Lines in Brooklyn—Appreciation of A. W. Robertson by Earl Whitehorne—100 New Cars Recommended for Cleveland.

Golden Silence

with NOISELESS GEARS

IN modern street car operation, silence is golden. Golden because it means increased good-will and greater patronage; also less outlay for repairs.

In many ways Westinghouse-Nuttall gears are proof against noise. The smooth, even load transfer of the helical design prevents chattering. Even after long service, they do not become noisy from wear because the exclusive Nuttall BP heat treatment increases the life of these gears to four times that of ordinary gears.



In addition to these silencing qualities, Westinghouse-Nuttall has developed a device which eliminates the high-pitched ringing sound characteristic of all metallic gears. This consists of a wrought iron ring built rigidly into the rim on each side of the gear, with a non-metallic layer interposed between the rings and gear rim. This is the exclusive Westinghouse-Nuttall method of eliminating noise from these gears.

Westinghouse Electric & Manufacturing Company
Nuttall Works Pittsburgh, Pa.
Sales Offices in All Principal Cities of the United States and Foreign Countries

MEMBER ELECTRICAL EQUIPMENT MANUFACTURERS ASSOCIATION AERA 1929

Westinghouse

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Goodyear equipment is used exclusively on the 46 coaches of the Southland-Red Ball Motor Bus Co., Austin, Texas.

"Riding the Greyhounds through Texas"

Here is a report of Goodyear performance so typical that we let the letter speak for itself.

"After several years' operation of motorbuses on various makes of tires," writes Guy J. Shields, General Manager of Southland-Red Ball Motor Bus Co., "experience has taught us that Goodyear All-Weather Tires are unsurpassed in quality as well as ability to render 100% traction under any kind of weather or road condition.

"For the past two years we have used Goodyear Tires exclusively on our fleet of forty-six coaches, 95% of which are six tire units.

"At present we are operating 187,791 miles per month, while our total mileage for the past two years amounts to 3,314,734 miles over all kinds of roads; have carried 485,279 passengers safely to their destination.

"While our operation is entirely within the state of Texas, where the extreme heat is a severe test of any tire, we have been receiving a consistently high average on Goodyear Tires, and, in some instances received 46,000 miles per tire.

"The most wonderful thing in our experience with your company has been the excellent service rendered us up and down our three hundred sixty-nine miles of highway."

Such tire performance plays its part directly in producing profits through economical operation —and at the same time brings indirect profits due to the increased patronage attracted by maintained schedules and safe delivery of passengers year after year.

The exceptional records of Goodyear Pneumatic Cord Bus Tires are based on definite superiorities of construction. The Goodyear ALL-WEATHER TREAD has no equal for safe, powerful traction and slow, even wear. Long life, greater vitality, and unusual freedom from "fatigue" or failure due to repeated flexing, are due to the extra-elastic, extra-durable SUPERTWIST Cord, used *only* in Goodyear casing construction.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service, and there are also Goodyear Rubber Tire Chains

GOODYEAR

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BETTER RAIL, BETTER TRANSPORTATION

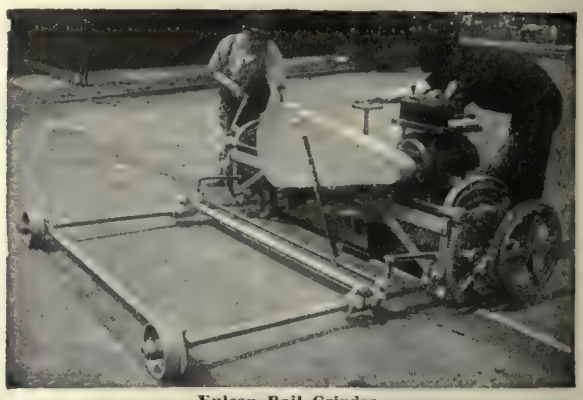
Do your cars act their age?

How young does a new car act as it rolls over corrugations, dished joints and battered crossings?

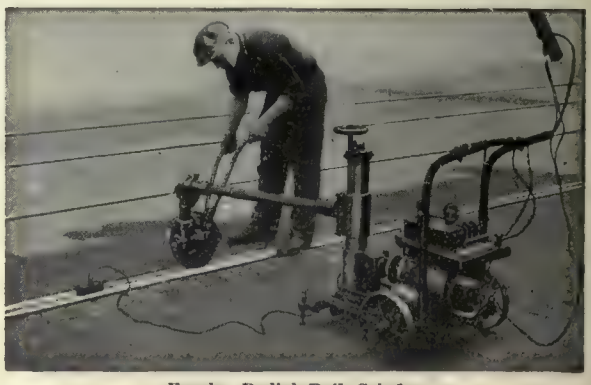
How long will it keep its youth?

A 1900 model will ride more youthfully on smooth track than a '29 model going over the bumps.

Good track?
Look at the pictures.



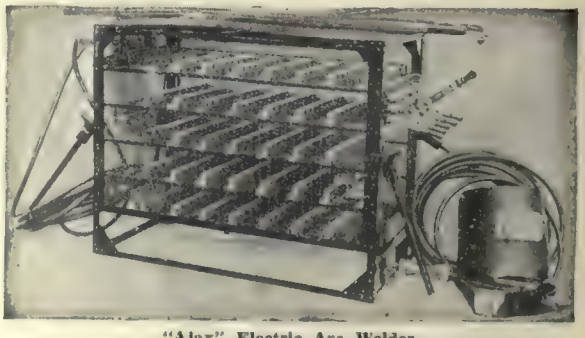
Vulcan Rail Grinder



Eureka Radial Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Arc Welder

Railway Track-work Co.
3132-48 East Thompson Street, Philadelphia

AGENTS
Chester F. Gailor, 50 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
H. F. McDermott, 208 S. La Salle St., Chicago
P. W. Wood Railway Supply Co., New Orleans, La.
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3177

BETTER RAIL, BETTER TRANSPORTATION

SHELBY SEAMLESS POLES

Tested in our plant
Proved in actual service

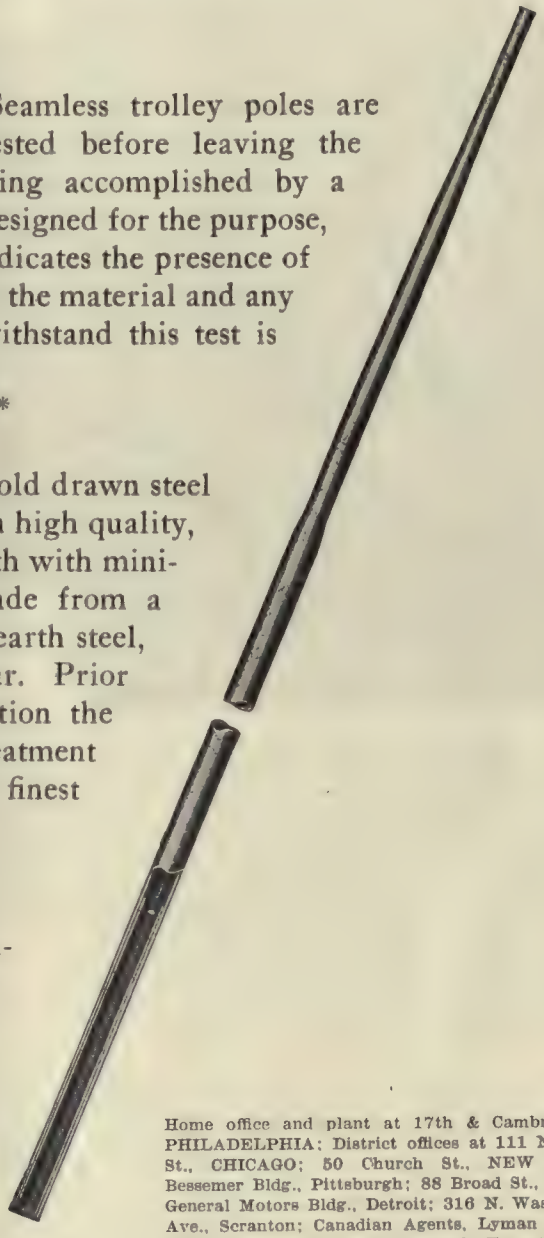
All Shelby Seamless trolley poles are individually tested before leaving the factory, this being accomplished by a special machine designed for the purpose, which infallibly indicates the presence of a permanent "set" in the material and any pole that does not withstand this test is rejected.

* * *

Shelby genuine seamless cold drawn steel trolley poles are of uniform high quality, combining maximum strength with minimum weight. They are made from a selected grade of basic open hearth steel, low in phosphorous and sulphur. Prior to the last cold drawing operation the material is given a special heat treatment which leaves the grain in the finest condition.

* * *

Shelby Seamless trolley poles are manufactured in two standard designs known as Style A and Style B, both being 1½ inches in diameter at the butt. We also make an extra heavy pole, 2 inches in diameter. Shelby Poles spell the end of pole worries. Write for detailed specifications.



Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

8 of 10 Equipment



The O-B Featherweight Trolley Base, weighing only 73 lbs. employs Timken roller bearings; and is all-steel welded construction. Page 56, Supp. No. 2 to O-B Catalog No. 20.



The O-B Trolley Catcher effectively vents "stepping up" and the damage positive operation causes. Thousand service for years. Page 758, O-B Cat No. 20.



The O-B Feist Trolley Wheel and Harp requires no oiling during its service life and doubles mileage. Page 58, Supp. No. 2 to O-B Catalog No. 20.

MAINTENANCE expense is an important item in determining the cost per 1000 car miles of car equipment. Car equipment generally gives many years of service. With little market difference in first cost, maintenance assumes great importance. The most profitable buy is therefore dependent on *selection*, based on lowest maintenance expense.

Superintendents of equipment and master mechanics, on the great majority of electric railway properties in the United States, have demonstrated the low maintenance cost of O-B Car Equipment—they prefer and specify O-B.

Their experience is neither recent nor limited. It started a quarter of a century ago. It embraces a great many different products; practically every operating condition; and all types of service.

Such universal acceptance of O-B products has placed a responsibility on O-B—that of keeping pace with changing conditions, and supplying products best suited to the demand. To that end O-B engineers continually contact and work with the master mechanics of the industry. Together new ideas are developed, and products created or improved to take care of new conditions.

And all to one end—that O-B car equipment shall perform 100% efficiently—with a minimum of maintenance expense—with less supervision, inspection. repairing and labor.

The result of such high standards and such sincere effort is best shown by the fact that O-B Car Equipment will be found on 8 out of every 10 electric railway properties in the United States.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1017CD

Ohio B Brass Co.

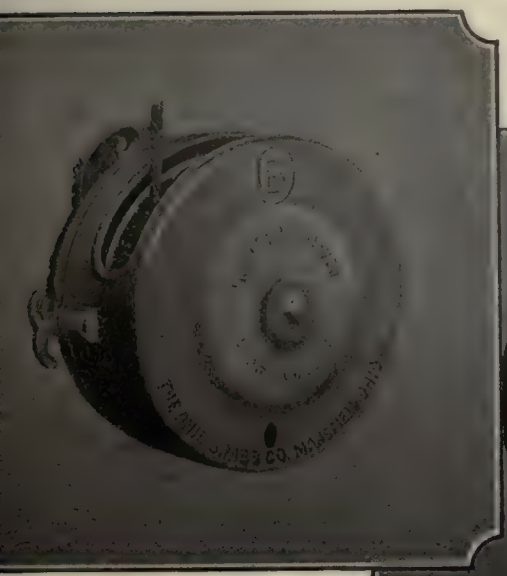
NEW YORK CHICAGO PHILADELPHIA PITTSBURGH ATLANTA CLEVELAND BOSTON SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

Men Agree!

DOLLAR AND SENSE INVESTMENTS

The practice of testing car equipment to the "Dollars and Sense" measure, that each O-B product shall serve better and do its share in reducing operating costs, is a regular procedure at O-B. Splendid examples of the advantage of this practice is found in the cost-saving features of the O-B Featherweight Trolley Base and the improved O-B Feist Wheel and Harp. Literature outlining these advantages is available, upon request.



The ZP Special, an O-B Headlight designed for city service. Recess mounted. Prysmatic glass reflector and heat-resisting glass lens. Throws a diffused light well ahead of car. Page 53, Supp. No. 2 to O-B Catalog No. 20.



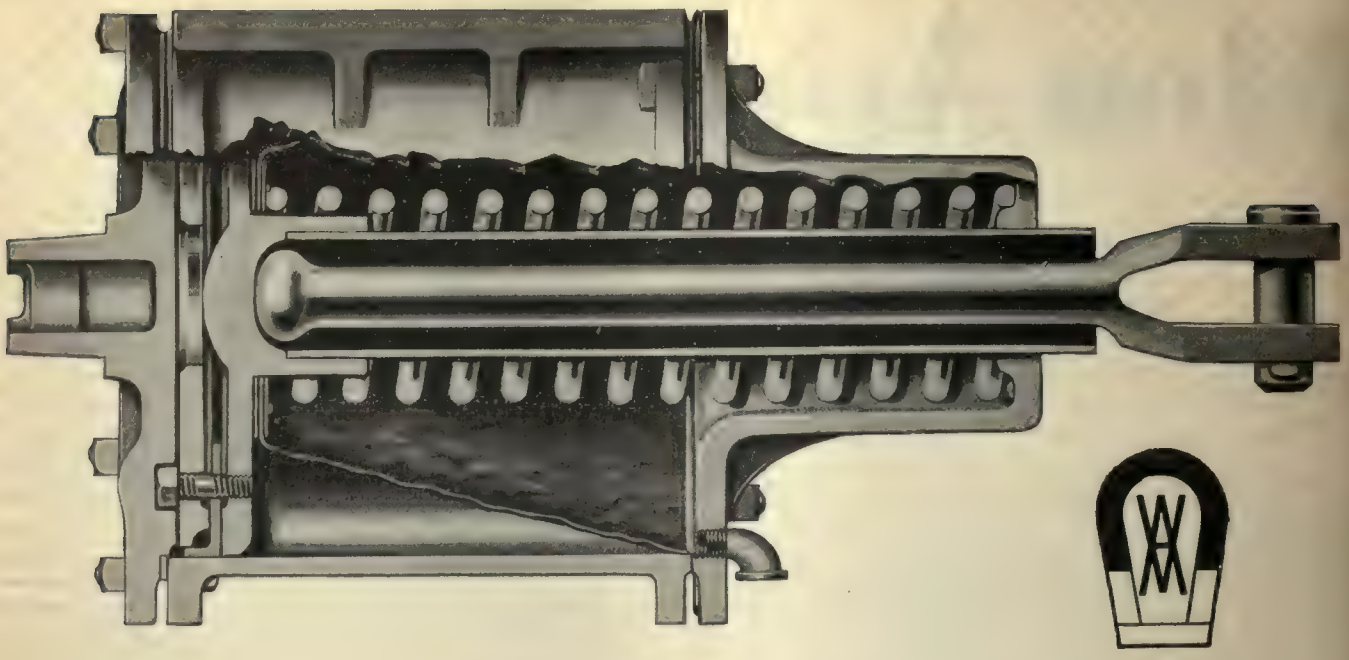
The DCP Type O-B Headlight for high speed interurban service. Provides maximum pick up and track illumination. In addition to portable type shown,, can be furnished for roof or dash mounting. Page 100, O-B Headlight Catalog.



hen the trolley wheel leaves the wire. pecially at high speed, the quick, positive pping and retrieving action of the O-B olley Retriever is an essential protection overhead. Page 760, O-B Catalog No. 20.

e parade of the new cars recently placed in service by the Delaware Electric Power Company Wilmington, Del. O-B Trolley Bases and O-B Feist Wheels and Harps, used on these modern rs, will reduce maintenance expense.





Keep your Brake Cylinders CLEAN *with this new Protector*



Use of this protector will lengthen the life of packing cups, reduce leakage, and decrease maintenance costs. It will pay you to specify them for new equipment and also order for cylinders now in service.

An effective means has been devised for preventing dirt and moisture that may sift into the brake cylinder at the non-pressure end from reaching the cylinder walls.

This is a collapsible water proof hood, flanged at one end to form a gasket between the cylinder body and non-pressure head, and held against the piston head by the release spring.

Dirt and moisture are trapped by the hood and discharged through a drain connection at the bottom of the non-pressure head, when the brake is applied.

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, WILMERDING, PA.

2236

WESTINGHOUSE TRACTION BRAKES

Here's A Way To Stop Demands For Track Renewal~



The Dayton Integral System
Of Track And Paving Construction

Here's A Way To Stop Demands For Track Renewal

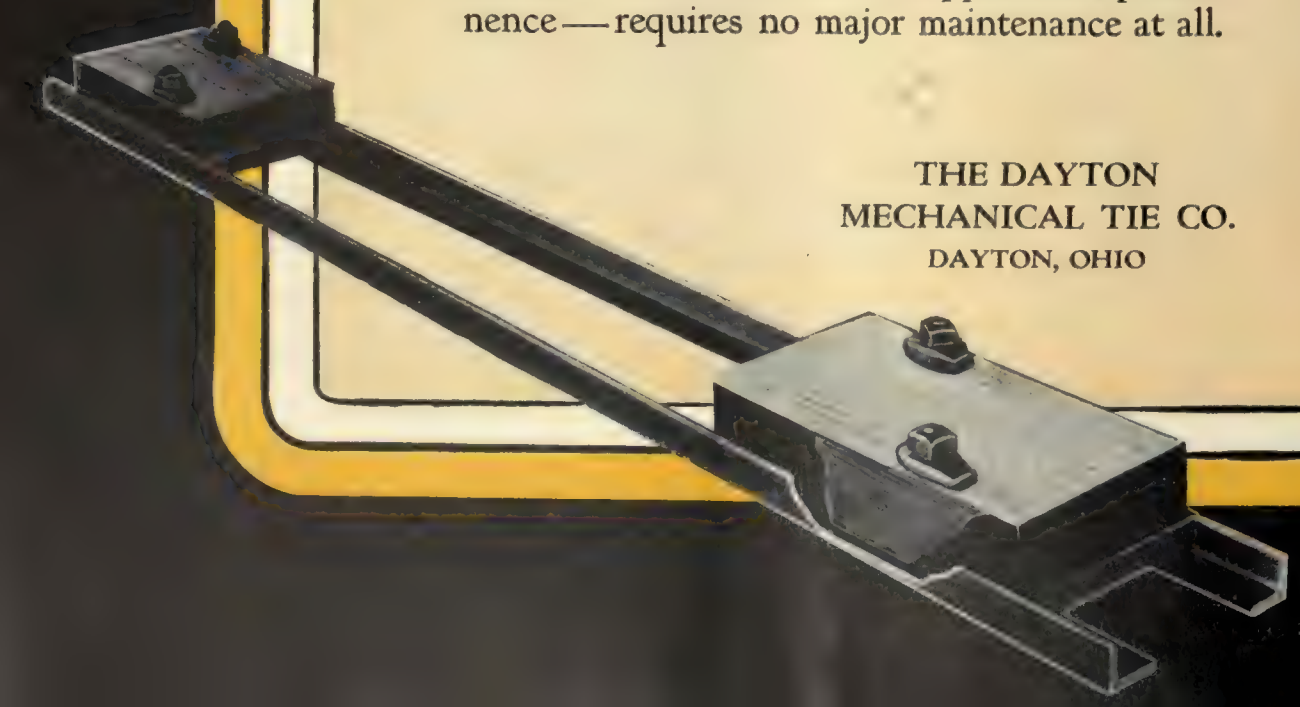
Almost any property you can think of, right now is facing demands by its city for repairing of certain pieces of track.

It seems that officials spend most of their time demanding such things. Certainly the track and paving failures have been annoyingly frequent.

Well, here is a way to stop the whole irritating business.

As you lay new track, use the Dayton Integral System of track and paving construction.

This provides a unified structure of track and paving which defies time — approaches permanence — requires no major maintenance at all.



THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO



American Brakebloks are better 9 WAYS says this operator



The superintendent of maintenance of an important bus operation has written us the following nine advantages he has found in using American Brakebloks.

1. "Softer application — jolting stops eliminated.
2. "Added life to tires.
3. "Reduced maintenance on rear axle assembly and drive shaft.
4. "Less skidding.
5. "Three times the mileage before relining.
6. "Less heat to inside tires.
7. "Grease does not retard braking effect of American Brakebloks.
8. "Elimination of all warped shoes and drum linings caused by excessive heat.
9. "About one-tenth the maintenance cost."

As rapidly as his buses need brake service, this operator is changing over to Brakebloks.

American Brakebloks—product of America's foremost braking experts—are made in sizes to fit any brake assembly—you make no change but the lining.

Your nearest N.A.P.A. distributor will supply your replacement needs.



American Brake Materials Corporation
Subsidiary of
The American Brake Shoe and Foundry Company
Main Office and Factory
Detroit, Michigan
Sales Offices: New York City; Chicago, Illinois; San Francisco, Calif.

Longer Mil



From Stage Coach to Motor Coach

THE development of passenger transportation from the stage coach to the motor coach parallels the growth of Cities Service lubrication service to the automotive industry.

Over many years Cities Service lubrication engineers have been helping some of the largest bus operators in the country to show greater profits through reduced operating costs. The Cities Service organization spends $1,000,000 a year on experiments and research to make such important results possible. The experts of the Cities Service research division are available for a lubrication study of your property.

Longer intervals between inspections and repairs have been made possible with Cities Service Bus lubrication service. This has directly resulted in reduced maintenance costs and *longer mileage life* for hundreds of vehicles.



ge Life



KOOLMOTOR BUS OILS are refined from 100% Pennsylvania crude oil to meet all the requirements of heavy duty, high speed motor bus lubrication. The scientific method used in refining accounts for its exclusive use by many of the largest motor bus properties in the country.

CITIES SERVICE OILS

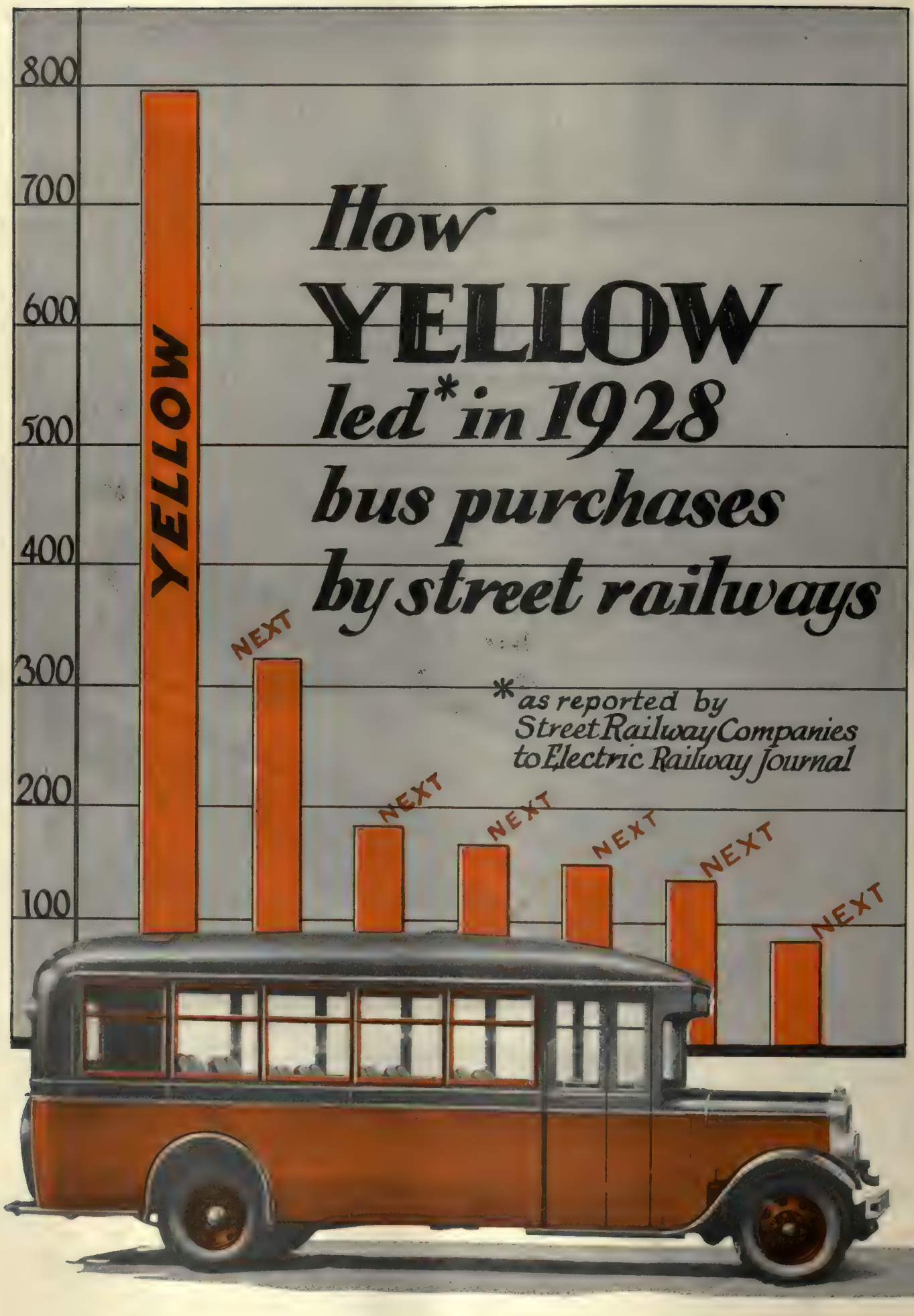
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OIL DIVISION

CITIES SERVICE COMPANY

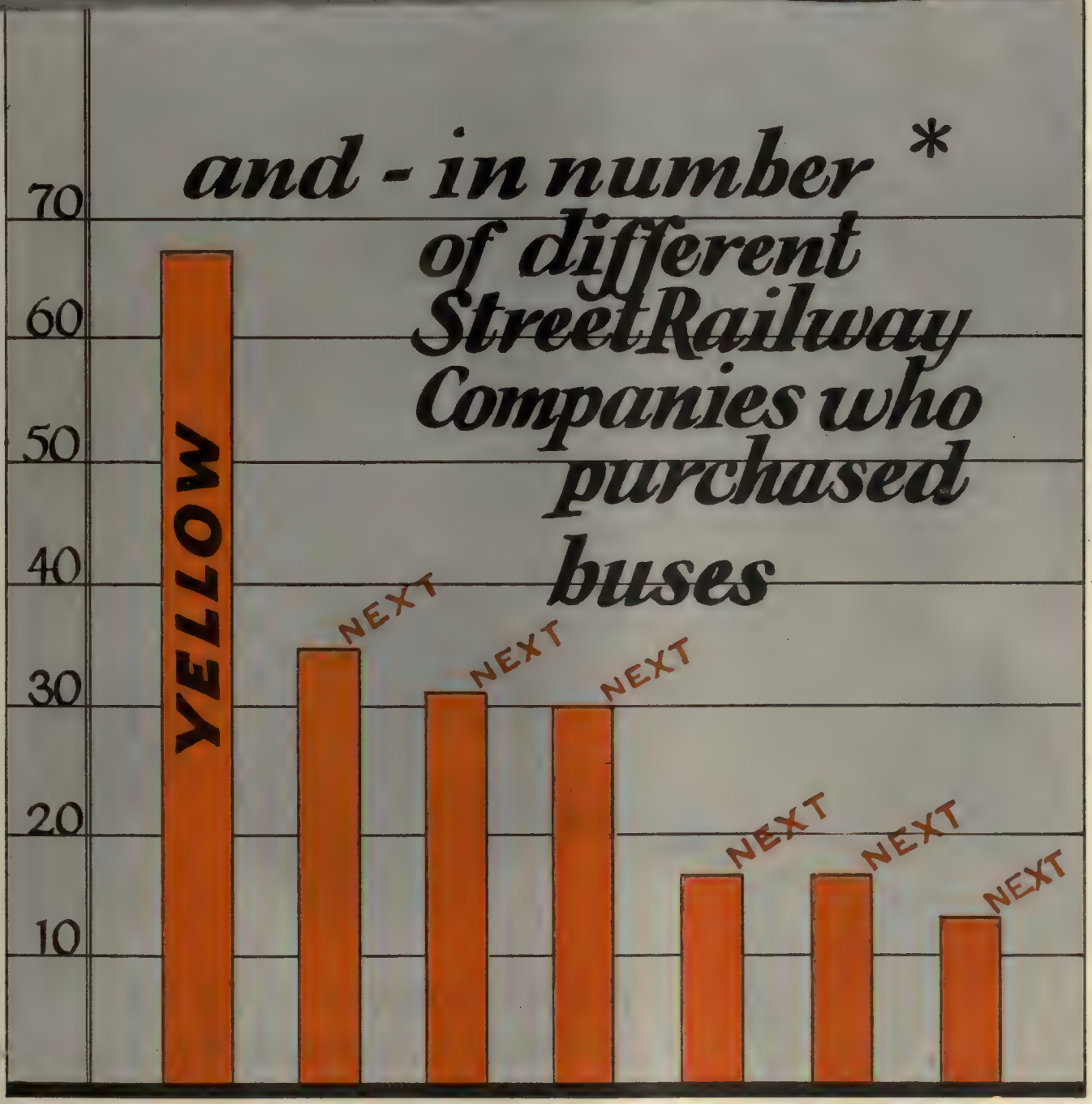
60 WALL STREET, NEW YORK, N. Y.

Koolmotor Products


800
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YELLOW
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NEXT
How
YELLOW
led* in 1928
bus purchases
by street railways
*as reported by
Street Railway Companies
to Electric Railway Journal



and - in number of different Street Railway Companies who purchased buses *



YELLOW COACHES



IN FAST INTERURBAN SERVICE—

How about your wheels?

Standard Wheels carry hundreds of thousands of passengers to the cities and back again every day. The speeds and quick stops necessary to maintain competitive schedules put unusual tax on wheel stamina.

Standard wheels hold up!



"FOR EVERY TYPE OF CAR

IN EVERY TYPE OF SERVICE"

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

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A Race Against Time

SINCE the first of the year, millions of dollars have been appropriated by electric railways for track construction. It is at this season of the year that these budgets become operative and large orders are placed for the activities of the coming construction season. It is worthy of note that for several years the volume of track construction has been steadily increasing. This indicates that electric railways are alert to the need for modernization of their properties. Developments in track equipment and material have kept pace with these increasing requirements, and consequently the electric railways are able partially to respond to the demand for improved facilities and service.

Contrast the track situation with that of electric railway cars. Experiments in car improvement were delayed until after the demand for cars to meet modern transportation conditions had become acute. Three years have been spent in experiments with new designs during a period when the necessary improvements should have been available—tested and tried in service—for the replacement of much of the obsolete equipment now in operation. True, there have been available cars of more or less conventional design, with few untried construction features, that offer advantages in operating economy and increased attractiveness ample to justify immediate replacement of the old equipment on many properties. The records of those properties that have gone ahead on replacement programs prove definitely that the industry is paying a high price for the continued operation of its obsolete equipment. But, apparently, the best types of conventional equipment available have not measured up fully to the average executive's ideas of what is needed to meet automobile competition, for during the past several years there has been a steady decline in the number of new cars ordered each year. Although this year promises a considerable increase in car buying, the full tide of replacement activity cannot be expected to set in until the present experimental stage is past. Perhaps consideration should be given, also, when the subject of car replacement is being studied, to the question of merchandising acumen in the car equipment field.

Undoubtedly, the lag in the development of cars has held back the entire rehabilitation program. It avails little for a railway to improve its roadbed if its equipment continues to discourage the public from using its service. Furthermore, to say the least, it is rather expensive to hammer and pound new track to pieces with tons of obsolescence. It seems quite reasonable to expect that with the expedited modernization of cars, track reconstruction will continue to show accelerated gains. Only then will the rehabilitation process in the industry have reached its proper pace. Today, the industry is engaged in a race against time. The automobile has acquired a tremendous momentum, driven forward by the courage and confidence of its sponsors. The public has tasted luxury in transportation and likes it. Nothing short of full measure will now satisfy it in public transportation. The industry must meet the changed conditions—and that quickly, or the street car will be literally crowded off the streets.

Digging Below the Surface

GOOD performance is something of which to be proud. Freedom from trolley breaks, pull-ins, accidents, etc., are accomplishments that reflect credit upon those charged with maintenance responsibility. But for those to whom the records established on a neighboring property serve as a stimulus toward greater efficiency, there is needed something more than the surface figures. A knowledge of just how the good results were accomplished is all-important. Below the figures themselves are questions of policy, organization and methods. It is to these that we must look for the explanation of favorable records.

Efficient maintenance of track, lines or rolling stock demands a well-balanced and capable supervisory force. Upon it largely lies the responsibility of planning and organizing day-to-day operations. Here alone there is a wide range of opportunity for saving or waste. A second fundamental in efficient maintenance is a definite and carefully considered program for systematic inspection. The adage that an ounce of prevention is worth a pound of cure is of particular importance to the maintenance man. Defects should be prevented rather than repaired. Renewal before a part actually fails in service is the secret of establishing favorable records for freedom from car pull-ins or trolley wire breaks. Furthermore, it is extremely significant that favorable service failure records are usually accompanied by relatively low unit maintenance cost figures.

Systematic maintenance records represent a third and very important factor in efficient maintenance. Simple, accurate and adequate historical data on important equipment parts enable the maintenance executive to detect sources and causes of difficulty and expense. Adequate records should permit responsibility for poor workmanship or defective material to be located readily when a failure occurs. An efficient record system should serve to give reliable information as to the life of equipment and parts. It should help to identify the type and

This is the issue in February that is devoted essentially to maintenance and construction subjects

make of apparatus which gives the best results in service and so should guide in purchasing new equipment. Proper records also aid in the work of keeping a quantity of renewal parts on hand sufficient to permit repairs to be made promptly, without at the same time building up heavy accumulations of surplus stocks.

There is no greater stimulus to maintenance efficiency than frequent visits to other properties—provided these trips are taken seriously and the other man's practices are viewed with an open mind. One is impressed with the great variety of practices that are followed in doing common maintenance jobs. Some methods are better than others, but all too frequently men responsible for maintenance are inclined to be self-satisfied, or have not been given the opportunity to inspect the methods used in other shops.

It is in these methods that the explanation is found of creditable pull-in and cost achievements. Only a determined attitude of self-improvement will accomplish this much to be desired purpose.

Specification for Special Trackwork Materials Approved

ANOTHER step in the advancement of the purpose of the American Standards Association has been accomplished in the recent announcement by that body of its formal approval as "American Tentative Standard" of the specifications for materials for use in the manufacture of special trackwork. This project has been going forward for several years sponsored by the American Electric Railway Engineering Association.

The specifications cover materials for which there are but two principal user industries—the steam railroads and electric railways. It is perhaps the first time that the electric railway industry has had an opportunity to take the lead in sponsoring a work which so vitally affects the interests of the steam railroad. Somehow, the thought in steam railroad circles has apparently prevailed that there were inherent differences in the tracks and special trackwork used by the two industries. The fact that a specification for materials entering into special trackwork manufacture could be prepared by the sectional committee under A.S.A. procedure, goes far to dispel such a thought and leads to the realization that the tracks used by both industries differ more in location than in any other way, and even here many electric railways have locations similar to steam lines, upon private rights-of-way. Tracks in the electrically operated subways require rails and special trackwork just as heavy and as complicated as do the trunk-line tracks of many steam railroads. At the same time, the steam lines have a sizeable mileage of tracks in paved streets where tongue switches, mates and frogs such as are used by electric street railways are a requirement of their track construction.

The Engineering Association and the sectional committee in charge are to be congratulated upon the outcome of their labors on this project, particularly in view of the fact that the mutuality of interest of the two great transportation industries in specifications for track materials has been proved. The new specifications merit careful study by managers, engineers and purchasing agents with the purpose of putting them into effective use in the control of purchases for material which, in the electric railway industry alone, runs into expenditures of millions of dollars annually.

Heavy Inspection a Means of Cutting Costs

IMPROVEMENTS and refinements in the equipment of cars have made it possible to increase the time between overhauls to a considerable extent. Inspection work which ordinarily includes light repairs is done on a mileage basis on most railways. This brings the cars into the shop at intervals of a week or ten days. There are many parts that can go longer than the regular inspection periods without attention but which must have considerable work done on them between general overhauls.

This has led many railways to introduce another period that comes between inspection and overhauling. By some, this is called heavy inspection; by others, intermediate overhauling. The work done, however, is quite similar in character. This includes repacking of bearings, testing and setting of circuit and line breakers, cleaning and painting of string bands on armatures, cleaning and painting of many equipment parts that are subjected to arcing, testing and replenishing of fire extinguishers, lubrication of side and center bearings and similar work.

Many advantages result from a program of this kind. It eliminates much work that is unnecessary at such frequent intervals as regular inspection periods. Consequently there is a saving in labor and cars are returned to service quicker. Furthermore, inspectors are relieved of much heavy work that can be done better by partial dismantling and removal of parts to a bench at the heavy inspection time. This, in turn, insures more thorough attention and better workmanship.

For greatest flexibility the heavy inspection interval should be a multiple of the regular inspection period. If cars are inspected every 1,000 miles, the heavy inspection period would be every 10,000 miles so that the heavy work would be done every tenth time that a car comes into the shop. In making a general effort to increase the interval between regular inspections, as a means of cutting costs, the heavy inspection plan has proved advantageous from the standpoint of insuring against service failures and in the interest of economy.

Philadelphia Looks Ahead in Planning Its Subway

GUIDED by the principle that the greater the number of people that can be carried through a subway in comfort and safety, the greater the potential benefit to the public in return for the expenditures made for tube and equipment, the city of Philadelphia spared no expense in making the Broad Street subway, its newest transit facility, capable of expansion to meet the city's future requirements. The subway, as now being operated, has two through tracks from City Hall to Olney station on the north, but the tube was constructed to accommodate four tracks, and as soon as the traffic warrants, the other two will be laid and express service started. Other considerations were borne in mind when this newest subway was designed. For example, station locations and arrangements were selected to permit co-ordination of the subway service with other transit facilities, and to make for easy and rapid movement to and from trains. Car seating and door location were planned for rapid loading and unloading. Also, the alignment, profile and track layout, the signal and other safety devices, the car

motors, brakes and couplers, the terminal and yard connections, etc., all were designed for expansion of service to provide frequent, rapid and safe train operation.

Before the actual construction details of the Broad Street subway were prepared, the Department of City Transit made an extensive study of rapid transit needs and submitted plans for a city wide system. The Broad Street subway unit is a part of this comprehensive plan. It was designed as the backbone of the entire system. This accounts for the attention given to provisions for expansion and extension, as described in the article in last week's issue of ELECTRIC RAILWAY JOURNAL. At the extreme northern end of the line extra track spaces were provided a little beyond the regular line to allow the extension of the four tracks northward at any time, without disturbing the existing structure or the present operation of trains. At Ridge Avenue, a little more than a mile north of City Hall, provision was made for a two-track branch to extend to Darby through West Philadelphia, by a special six-track, two-level connection. Other important provisions for future development include a ramp at Erie Avenue to permit local trains to turn back without crossing the express tracks at grade; an extension to South Street, now under construction, the separation of mezzanines to allow for the crossing of major utility structures; plans to expand the shops and terminal yard to accommodate the maximum number of cars that will be needed on the completed system, and the pedestrian concourse project at City Hall.

When this project is completed, passengers arriving at City Hall either by the Broad Street subway, the Market-Frankford subway-elevated, underground street cars, the Pennsylvania Railroad or the Reading Railroad, will be able to walk underground among the several transportation systems or to buildings adjoining City Hall Square, as well as to points several blocks in any direction from City Hall. The entire improvement program is a very comprehensive one. It shows great vision on the part of those responsible for it, in planning for future as well as present requirements.

The Subsidy As a New Shibboleth

INDISPOSITION on the part of cities resolutely to face their local transportation problems, and inability of operating companies to devise a schedule of fares that will be compensatory and which will not at the same time drive away riding, have given rise to the revival of talk of subsidies as a way out. It is the weak way out, if it really is a way at all, but since the matter in one form or another has come up for discussion in recent proposals made in the Twin Cities, in Akron, in Grand Rapids, in Seattle, and in other places, the issue is one that needs to be met. All of these cases have been reviewed recently in this paper.

In only one of them, Akron, has the subsidy suggestion come from the railway and then only as an alternative to an out-and-out franchise as remote in its conditions from the subsidy idea as could be wished. So unusual is the Akron suggestion, however, that it seems well to repeat that it is presaged on the local companies' billing the city at a fixed rate for the number of bus or car-miles the city may deem it will need, the city in turn to fix the fares that may be charged, presumably at a rate less than enough to raise the sum the company would receive from the city. In the Twin Cities the subsidy proposals emanated from a Councilman. In Grand Rapids it was the city engineer who made the suggestion. In Seattle it was purely a political proposal, intended to cover up the failure on the part of the city to convert the municipal railway into a paying proposition except possibly at a fare that would be so onerous as to attract unfavorable attention.

The situations in these cities do call for heroic treatment, but it would scarcely seem that the need exists for the application of oxygen by means of the political pulmotor which apparently is to be tried. Under such treatment the patient's breathing doubtless would be restored but it would keep up only as long as the treatment was continued. No, the electric railways do not want to be put on any such basis. It would be bad for them and it would be bad for their communities. New York is a shining example of the fact that people ride for 5 cents on the subways while $40,000,000 goes into the ctiy's budget to make up various charges, among them one of $14,000,000 a year alone to meet the excess costs over the receipts on the original subway lines. Furthermore, under this unsound policy New York continues to lag far behind its growing need for transit facilities. An unsound economic policy may be expected to reproduce this condition in any city that ventures to adopt expedients in the solution of its transit problems.

Local transportation is an essential industry. It should be so treated and should stand on its own feet financially, if it is to be developed on a sound basis that will permit it to keep pace with changing conditions and growing community requirements. That is not to say that construction costs for rapid transit lines and even surface railways, that create property values in exactly the same way that a new highway creates them, should not be assessed against the benefited property instead of carried perpetually by the car rider. But that is a far different matter than the several forms of economically unsound subsidies that are surreptitiously coming to the forefront. Instead of these, efforts should be directed toward the development of scientific schedules of rates under which the fares paid by various classes of riders will be more nearly in proportion to the cost of the service which each class of rider buys. The issue must be faced squarely, and it will prove futile to resort to any means that would make local transportation a political step-child.

ELECTRIC RAILWAY JOURNAL lends its space to a discussion of the matter only in the hope that its word of warning may have the effect of staying the possible course of a movement it is convinced is a futile compromise with sound economics and sound political policy. Of course, where a city will not face the issue squarely, its only hope of retaining the service it desires is by the subsidy route. That is the way of compromise. It is the weak way, not the virile way. Just such expedients as these and lack of foresight that, in the past, loaded on the industry fixed term franchises, paving charges, and flat fares. All the blind alleys of the subsidy proposal lead to the inescapable conclusion that a subterfuge is still a subterfuge, no matter how it may be labeled in the tax budget. Subsidy is surely a step toward political tampering. At the last Cleveland convention Owen D. Young pointed out that the greatest objection to public ownership of utilities is that it substitutes a political check on management for an economic check. Subsidy eliminates the economic check and opens the gates to a horde of socialistic Utopia makers.





No. 1. Workmen cleaning equipment by use of compressed air

No. 2. Inspector at work on switch group. The receptacle for drop light and the cut-out switch can also be seen at the left

No. 3. Car body inspectors at work repairing windows and hand straps

No. 4. Packing of journal boxes is removed and new oil soaked waste used to repack on 180-day inspection basis





No. 5. To lubricate center and side bearings, cars are raised by pneumatic jacks

No. 6. Dressing up trucks and connecting their brake rigging after receipt of cars from the intermediate truck overhauling shop





SPECIAL INSPECTION

Increases Shop Efficiency

By Clarence W. Squier
Associate Editor *Electric Railway Journal*

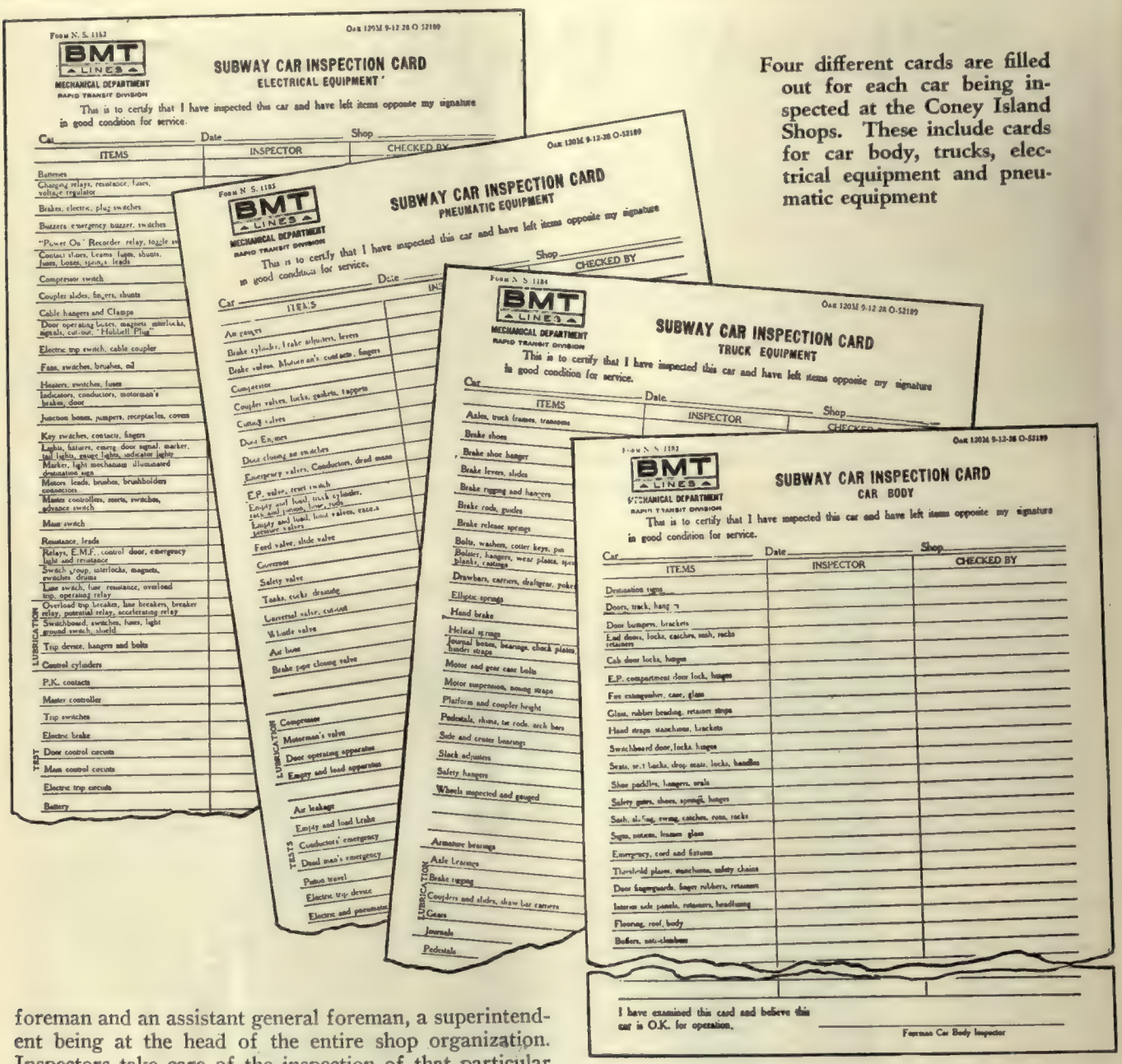
By concentrating the work of inspecting subway cars at the Coney Island Shops, the Brooklyn-Manhattan Transit Corporation has built up a force of specialists who perform their duties with unusual skill and speed

This is the seventh of a series of articles describing methods and equipment in the Coney Island shops of the B.-M.T. Corp. Others were, "Truck Overhauling," published April 21, 1928; "Intermediate Truck Repairs," published May 5, 1928; "Wheel, Gear and Axle Maintenance," published May 19, 1928; "Motor Overhauling," published June 16, 1928; "Bearing Practice," published July 21, 1928; and "Forge Shop Equipment," published Aug. 18, 1928.



Electrical inspectors at work on panelboard and door operating contacts

PREVENTING delays and equipment troubles in service is the real function of the inspection shops of the Brooklyn-Manhattan Transit Corporation. If a car gives trouble on the road the first question is: "When was that car inspected last?" and next: "What work was done and who did it?" This information is made available through a simple but accurate record system that starts as soon as a car is delivered at the shop for inspection by the transportation department and continues through the various stages of the repair work. Car numbers are entered in a book by the inspection clerk as the cars are received. The clerk then hangs four inspection cards on each car. There is a blue card for car-body work, a buff card for truck inspection, a green card for electrical equipment and a pink card for pneumatic equipment. Each card has a list, arranged alphabetically, of the equipment to be inspected, lubricated or tested. At the top of each card is space for the car number, the date and the name of the shop. The body of the cards has three columns. Items are listed in the first column. The second provides space for the signatures of inspectors, and the third is for the names of the assistant foremen who checked the work. At the bottom is a line for the signature of the foreman inspector. The work of inspection is divided into four major classifications corresponding to those given on the inspection cards. A foreman supervises the work for each classification. There is also a general

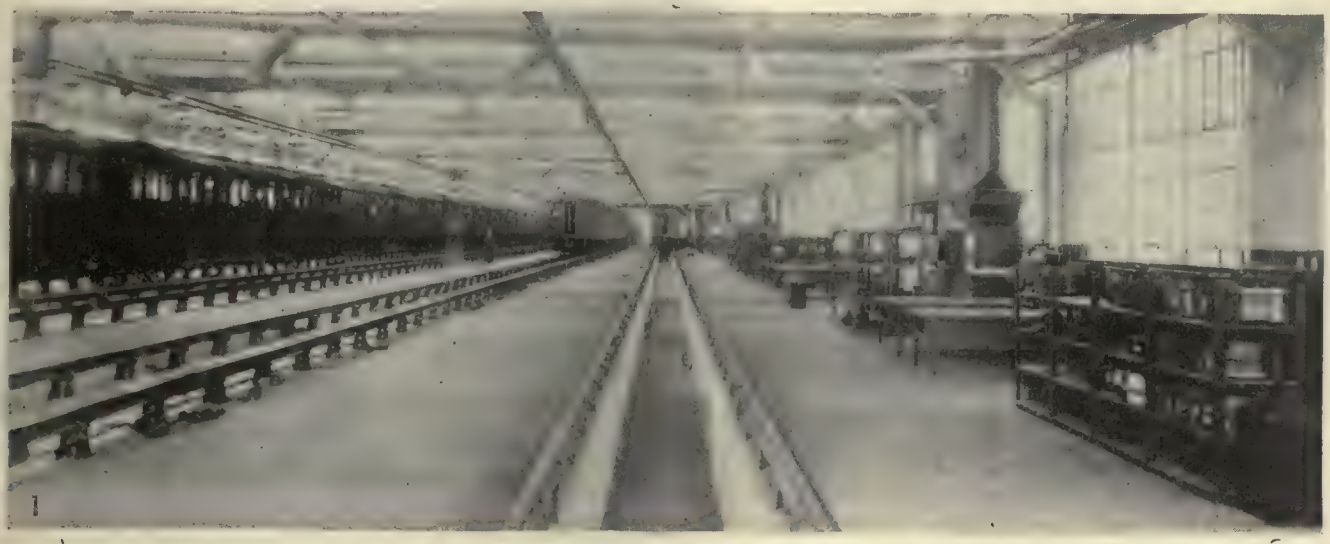


Four different cards are filled out for each car being inspected at the Coney Island Shops. These include cards for car body, trucks, electrical equipment and pneumatic equipment

foreman and an assistant general foreman, a superintendent being at the head of the entire shop organization. Inspectors take care of the inspection of that particular class of car equipment to which they are assigned. The work under each of the major classifications is further specialized so that in electrical equipment, for example, items are subdivided into eight groups, each of which has an inspector and assistants who devote their attention to that particular work. Pneumatic equipment is likewise divided into six groups, with special inspectors for each classification. The inspector certifies, by signing the card, that he has inspected the particular class of equipment opposite his signature and put it in good condition. As a final check on the work the foreman of each major classification signs each card for his class of work to indicate that he has examined the car and believes it to be in fit condition for operation.

The cards are made part of the official shop record and provide an easy and accurate source of information as to who inspected an individual item of equipment and the date when the inspection was made. The individual signatures on the card leave no possibility of question as to who is responsible. After the cards leave the custody of the foreman and before they are filed each is checked by the office staff to make sure that there is individual certification as to the inspection and checking of each item of equipment and also the general certification by the foreman on each card.

An idea of the degree to which specialization is carried and the manner in which the electrical equipment is subdivided may be obtained from a brief outline of the work. One man inspects and tests the batteries. A second inspects and lubricates the electric brakes and the plug switches, "Power On" recorder, relay and toggle switch. A third man takes care of the inspection of the buzzers, switches, door-operating boxes and incidental magnets, interlocks, signals, cutouts and plug contacts. A fourth devotes his attention to the inspection of contact shoes, and beams with the incidental fuses, shunts, fuse boxes, springs and leads. A fifth inspector specializes in coupler equipment such as slides, fingers and shunts together with the cable hangers and clamps, junction boxes, jumpers, receptacles and covers. A sixth man is detailed to inspect electric trip switches, cable couplers, the motors with their leads, brushes, brush-holders and connectors. The lubrication of the automatic stop device, hangers and bolts



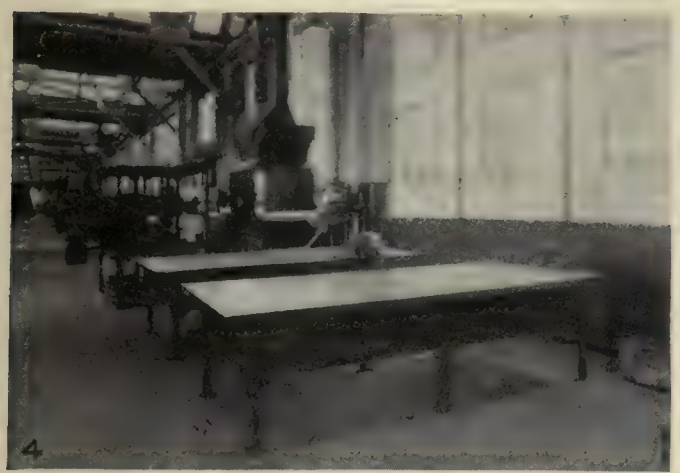
and the trip switches, together with the testing of main control circuits and electric trip circuits is taken care of by this inspector. The compressor switch, main switch, resistance and leads, line switch with its fuse, resistance, overload trip and operating relay, together with the interlocks, magnets, switches and drums of the switch group are inspected by a seventh man, who also lubricates the overload trip, the line breakers, the potential and accelerating relays, control cylinders and control contacts. An eighth man inspects charging relays, fans, heaters, indicators, key switches,





lights, markers, destination signs, master controllers with incidental reset switches, advance switches, EMF and other relays for control contacts, doors, emergency lights and resistances, in addition to which he tests door-control circuits.

Specialization of work and the efficiency of its performance have been assisted by having a new up-to-date shop. The inspection shop is a separate building located at the west side of the Coney Island shop group. It is 86 ft. wide and 600 ft. long. Vacant space to the west of the present building is to be used for additions as the volume of





No. 1. General view inside inspection shop. At the right is seen the arrangement of racks and benches for material
No. 2. The battery bench has a shelf underneath for storage of batteries
No. 3. Shoe beam racks along the wall of the shop
No. 4. Work benches and maintenance material rack
No. 5. Carpenter and glazier's work bench. Racks for glass are seen in the background





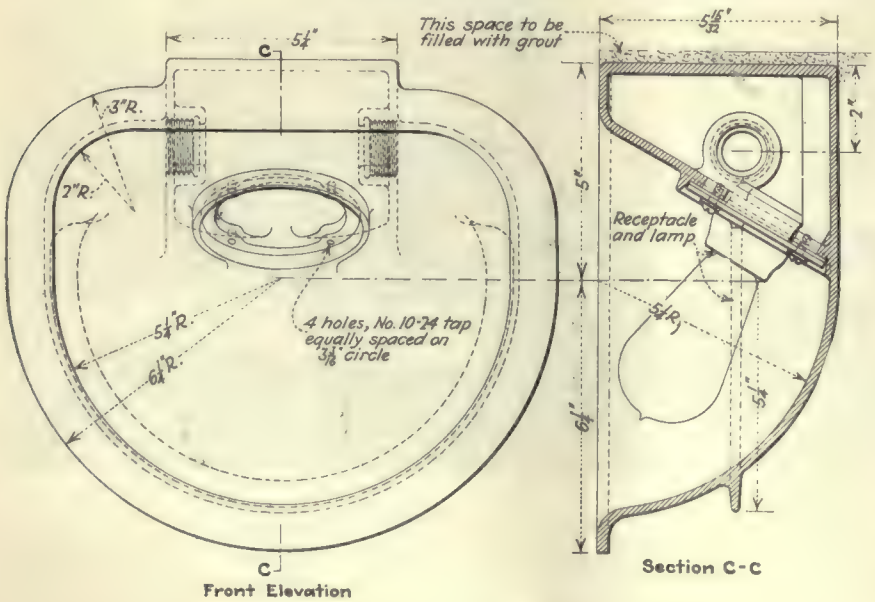
At left—Water rheostat and switchboard used in the testing and adjusting of line switches. At right—In the foreground are cabinets for workmen's tools. Back of this are racks used for distilled water and behind these is the foremen's pulpit office used by the electrical foreman

work increases. Four tracks pass entirely through the building from end to end. These are provided with motor-operated curtain-type doors so cars can enter and leave from either end of the shop.

Each track has a pit for its entire length. Tops of track rails are 15 in. above the floor level. The rails are supported on cast-steel chairs so there is a clear space of 9 in. between the floor and the bottom of the rail. Pits have a depth of 3 ft., 9 in. below the tops of the rails and are 4 ft. wide. The pit walls and floor are of concrete, and the floor is sloped to a drain at the sides. Special attention was given to the lighting arrangement for the pits. Lamps are spaced 14 ft. apart and are staggered in relation to those on the opposite side of the pit. White enameled porcelain reflectors in the wall nitches, with lamps projecting at an angle, throw the light upward to illuminate the undersides of cars. Receptacles are provided for plugging in drop lights. With each receptacle there is an inclosed switch so connected that with the drop-light plug in position, operation of the switch connects the drop light in the circuit and cuts out the adjacent pit light.

Receptacles are provided also for inserting plugs to furnish current for testing various pieces of electrical equipment on the cars. Where the apparatus to be tested is inside the cars it has been found most convenient to use a pole test circuit which hooks over the overhead trolley. There are no third rails inside the shop, and as the subway cars are provided with contact shoes but not with trolleys a special overhead traveling trolley with cable connection is used to supply power for moving the cars. The construction and operation of this overhead traveling trolley was described in ELECTRIC RAILWAY JOURNAL, March 18, 1922, page 474.

A compressed air pipe runs alongside each pit, with cut-in valves approximately every 20 ft., for use by the inspection force when testing the pneumatic equipment on cars and for cleaning purposes. Pits are provided with steps at each end and, at frequent intervals along the side, there are toehold niches to enable workmen to get in and out without having to go to either end. Cross planks with metal angles at the end to keep them firmly in place are also provided at frequent intervals, so that it is unnecessary for shop employees to jump pits when going from one side of the building to the other. Short stepladders are kept in the pits, so that there is no excuse for men standing on boxes or other makeshift equipment when their work requires them to get up close to the floors of the cars.



Light from the pit lamp is reflected upward

Subway cars, with the exception of service cars, electric locomotives, etc., have their regular inspection on a 1,500-mile basis. A leeway of 150 miles either way from the standard is allowed. This makes it possible to place the same number of cars over inspection pits each day. Where any subway car has not made the specified mileage in a period of 30 days it is arbitrarily ordered into the shop for inspection.

Inspection work is done at the Coney Island shop on 537 subway motor cars, 12 trailers and 116 triplex units. In ordinary service the cars operate the 1,500 miles in about a week's time. At present inspection work is done by both day and night forces, each working 50 hours per week. About 60 per cent of the cars are inspected by the night forces and 40 per cent by the day forces.

In addition to this regular mileage inspection, certain special heavy inspection work is done on a 180-day basis. Six cars are given this heavy inspection by the day forces each day. This 180-day heavy inspection is a convenient way of taking care of work that would interfere with the regular schedule if included in the ordinary inspection. Moreover, by working on only six cars a day, the men have more time to do the work carefully and efficiently than if done on regular inspection.

With this systematic arrangement of work and with the various inspectors classified so that they have a definite portion to do, it is possible to plan the work so that it is done most efficiently. To prevent interference between groups whose work is located in the same part of the car or of groups whose work might interfere because of a common location on certain definite parts of equipment to be inspected, two groups usually start working from opposite ends of the pit so that they cross each other's path only once.

In the regular work of inspecting trucks, inspectors examine the brake rigging, axles, wheels and brakeshoes. If there are any adjustments of brake equipment required that make it necessary to send the trucks to the intermediate repair shop, the inspector notes this on a prescribed form and arranges to have the truck transferred to the other shop. So as not to withhold the car from operation, the regular procedure is to substitute a serviceable truck for the bad order one. The inspection force then prepares the bad-order truck for delivery to the intermediate repair shop and also makes all connections on the good truck that has been substituted.

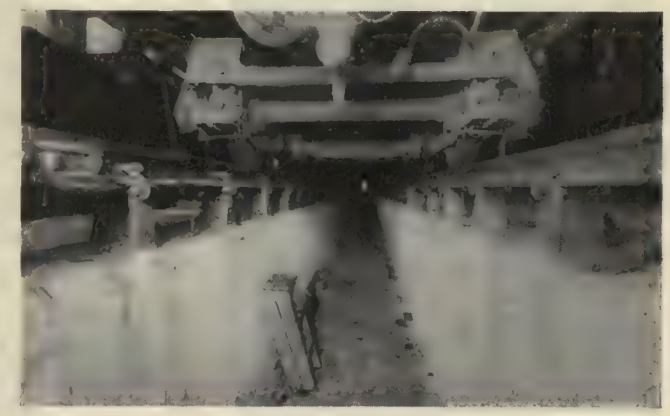
Other inspection work on trucks includes the lubrication of all wearing or movable parts. The waste in journal boxes is inspected and a packing iron is used to make certain that the waste is properly placed under the journal seat. Oil in armature and motor axle bearings is measured by gage provided for this purpose, and additional quantities, as indicated by the gage, are supplied. The packing used in the motor axle bearings and journal bearings is removed and re-treated on the 180-day inspection period. A two-man crew also lubricates both side and center bearings at the 180-day inspection. Car bodies are raised by pneumatic jacks placed on both sides. Shoe beams also are given a heavy inspection on an 180-day basis. This includes cleaning and scraping off the dust which has accumulated. After the cleaning the beams are repainted with an insulating paint.

To inspect the motors the covers are removed, the carbon brushes examined for wear and the commutator brush-holder and field leads looked over. Polepiece clearance for the armature is checked also. Surrounding parts of the armature and brush-holder are examined to discover any accumulation of dust, and compressed air is used to clean where necessary. After having been blown out with compressed air, porcelain insulators of brush-holders and the V rings at the ends of commutators are wiped off carefully. Motor leads and motor lead connectors are examined closely on regular inspection. Attention is also given to shoe fuses, terminals, fuse boxes, contact shoe leads, jumpers, etc., and repairs and renewals are made where necessary. Contact shoes are gaged and adjusted to proper height.

The control equipment, including the master controller, line switches, reversers, unit switch groups and operating interlocks are inspected carefully. Contacts are replaced where necessary, and any accumulation of dust is removed by blowing out with compressed air. After cleaning, the parts are lubricated. Operating magnet valves are tried out individually and also in their regular operation from the master switch. Motor resistors are inspected as part of the control inspectors' duties. Where it is found necessary to replace any parts, these are changed by a separate repair crew so as not to interfere with the regular inspectors' work. Switchboard contacts are cleaned and insulating paint is applied on the 180-day basis.

Electric parts of the automatic air and electric couplers used on the subway cars are overhauled on the 180-day basis. The slide contact pads are removed and contact fingers are replaced where excessively worn. The interior housing is cleaned out thoroughly. The tension on contact fingers is tried and fingers are gaged for proper height. The contact pad is inspected for wear on the contact surface. Where necessary, new pads or other parts are replaced at this time. On regular inspection where the electric portion is not dismantled the slide pad is pressed in so as to make an inspection of the contact fingers, and whenever an unusual condition is observed the housing is taken apart and required adjustments made. The drawbar automatic locking devices and equipment are tried out on regular inspection.

Men assigned to the work of inspecting couplers also inspect train line cables, jumpers and receptacles as well as the hangers from which they are suspended. This work is done on the 1,500-mile inspection basis. Electric automatic stop trips with which subway cars are equipped are tested on every inspection. Covers are removed, the electric contacts and fingers are inspected, the interior wiped and parts lubricated lightly. Tips are then reassembled and gaged for proper adjustment above the running rail and the proper centering of the trip arm after it is applied. The action of the electro-pneumatic valve used in the circuit is tested. Where adjustments or renewals are required on the trip equipment these are done by the inspector who examines them.



Pit and rail construction

The main panelboard, which includes the light, heat, fan, battery and compressor switches and also the various fuses used in connection with these switches, is examined on every mileage inspection, as are also the control and door-operating circuits.

Car cleaning is taken care of by the inspection shop. This includes the sweeping out of cars every 24 hours and the wiping off of interior portions. This work is all done at night or early in the morning before the cars go into morning rush service. Cleaning of glass is done at the time the cars come in for regular inspection on the mileage basis. This cleaning also includes the cleaning of globes and interior fittings. A combination of sand and pumice is used in damp form to cut the grease which collects on the window and door glass.

Winners in First Group of Departmen

Maintenance

April 15 is the closing date for the second section of "Electric Railway Journal's" Prize Contest. An early start will help each contestant and department to win the recognition they deserve for improved maintenance work. A folder giving full information and instructions will be mailed to those interested on request.

Automatic drain valve for air piping as submitted by HARVEY L. BULLOCK, *Electrified section New York Central Railroad, awarded prize in Rolling Stock Division — Double portable crossover described by* F. E. DAVIDSON, *Cleveland Railway, receives prize for Way and Structures Division— Piston ring compressor description by* CHARLES HERMS, *San Diego Electric Railway, given award for Bus and Garage Division—Auxiliary ground box for connections to electric track switches submitted by* L. H. MCADAM, *Toronto Transportation Commission, awarded prize in Electrical and Line Division.*



Harvey L. Bullock

IN THE rolling stock and shop division of ELECTRIC RAILWAY JOURNAL'S Maintenance Contest, Harvey L. Bullock was awarded the prize. He has just entered upon his duties as superintendent of the electrical equipment department at the Cleveland Union Terminal, Cleveland, Ohio. He formerly served as general foreman of electrical equipment in the White Plains shop of the New York Central Railroad since 1908, and during this period initiated many improvements in mechanical and electrical devices pertaining to multiple-unit cars and locomotives. He has been concerned particularly with the maintenance of rolling stock and has also brought out many improvements in maintenance and shop practice.

Mr. Bullock began his electric railway experience as electrician for the Schenectady Railway and later was promoted to carhouse foreman. He also worked for the General Electric Company at Schenectady in the construction department on electric locomotives. At that time the bipolar type ordered by the New York Central Railroad was being developed, and upon the electrification of the Grand Central Terminal in 1906 Mr. Bullock was transferred there as foreman in charge of multiple-unit cars and electric locomotives for the Harlem division. Mr. Bullock was born in Cohoes, N. Y., 45 years ago.

THE breadth of its field of utility and the advantages and economies resulting from the use of a device or method, were considered of particular importance by the judges of ELECTRIC RAILWAY JOURNAL'S Maintenance Contest in awarding the first group of prizes. The committee met at the headquarters of the American Electric Railway Association in New York City on Jan. 21 and devoted the entire day to the consideration of about 100 items submitted in the contest. All members of the committee of judges were present. Four prizes of $25 each were awarded for the best maintenance material submitted in the contest prior to Jan. 15, which was the closing date for the first group of articles. The prizes were divided, one each for the departments of (1) rolling stock and shops; (2) way and structures; (3) electrical and line, and (4) buses.

The rolling stock prize goes to Harvey L. Bullock, New York Central Railroad, for his automatic drain valve for the air piping of cars. Much trouble results from the freezing of air lines, therefore an automatic device for removing the water that accumulates will satisfy a long-felt want. The judges were impressed particularly with the high



F. E. Davidson

THE winner of the prize for the way and structures division of the contest, F. E. Davidson, is assistant to the superintendent of way for the Cleveland Railway, Cleveland, Ohio. He has been with that company since 1914, and his duties consist of measuring up and laying out special track work, and inspecting it at the factory before shipment. At present he is in charge of the drafting room and engineering work. That department designs all special work furnishings and provides data necessary for manufacture. He also worked for the Pennsylvania, Nickel Plate and Wheeling & Lake Erie Railroads.

Prizes in Contest

class of many of the methods and devices submitted in the rolling stock and shops group, and decided to give honorable mention to the cotter key extractor as described in the Jan. 19 issue of the JOURNAL by Farrell Tipton, electrician of the San Diego Electric Railway.

For the best item on way and structures the prize was awarded to F. E. Davidson, assistant to the superintendent of way Cleveland Railway, for his description of the double-portable crossover described in the Feb. 9 issue. Use of this crossover reduces the amount of space used in the street to 58 per cent of that needed with two single crossovers. Vehicular accidents and car delays are reduced also.

In the electrical and line department division the auxiliary ground box used in connecting wires from poles to electric track-switch boxes as described by L. H. McAdam, electrical department Toronto Transportation Commission, was awarded the prize. This box overcomes the difficulty of water entering the conduit and freezing in winter, which was experienced previous to its use.

The compressor for piston rings being installed in bus engine cylinders as developed in the garage of the San Diego Electric Railway receives the prize in the bus and garage division. This was submitted by Charles Herms, general foreman.

Most of the material received in the first division of the contest was of unusually high class and the judges were impressed particularly with the value of the practices described. A large number of ideas related to work in shops and to car equipment improvements. The other railway departments, particularly the line, electrical, bus and garage departments, are urged to send in more items connected with their work. The closing date for the second division of the contest is April 15 and all material should be sent in promptly so as to be eligible for one of the next lot of prizes.

Opportunity Is Knocking—Are You Alert?

READ the items submitted by these men who have won industry-wide recognition through their participation in ELECTRIC RAILWAY JOURNAL'S Maintenance Contest. The winning articles were published in the following issues: Nov. 17, 1928, page 483, "Automatic Drain Valve"; Dec. 15, 1928, page 1043, "Auxiliary Ground Box for Track Switches"; Jan. 19, 1929, page 129, "Piston Ring Compressor"; and Feb. 9, 1929, page 252, "Double Portable Crossover."

These items represent the kind of maintenance practices and devices that are constantly being developed by electric railway men throughout the country. You owe it to yourself and your company to enter this contest. Writing ability is not necessary. Send in a brief description of the practices that you think will be of interest to other railway men, and include a photograph or sketch. See the issue of ELECTRIC RAILWAY JOURNAL for Oct. 20, 1928, for full details or write in for a pamphlet describing the contest and giving full information for preparing articles. Don't put this off for the future. There is no limit to the number of items that can be submitted by any individual or department. Take your place with those who are winning industry-wide recognition in this contest. Entries for the second group of prizes must be received by April 15. Early entries receive preference in publication.



Charles Herms

THE winner of the prize in the bus and garage division of the contest is Charles Herms, general shop and carhouse foreman for the San Diego Electric Railway, San Diego, Cal. He has been with that company since 1923. He began his electric railway experience in 1919, with the San Antonio Public Service Company in Texas, as general repair man. He continued in this capacity for four years, when he was promoted to foreman over a crew engaged in remodeling cars.

Mr. Herms has always been interested particularly in mechanical construction, and during the war was attached to the first army headquarters in a motor repair unit. Other experience outside of the electric railway field includes supervision of the mill department of the San Antonio Portland Cement Company, and a position with the Boston & Superior Mine in Arizona, reconditioning the electric and telephone system of that company.



L. H. McAdam

FOR the electrical and line department division of the contest, the winner was L. H. McAdam, who is general inspector of switches and signals for the Toronto Transportation Commission. He joined the comptroller's department of the Toronto Railway in July, 1907, and was transferred to the electrical department in 1909, where he made a thorough investigation of electrolysis.

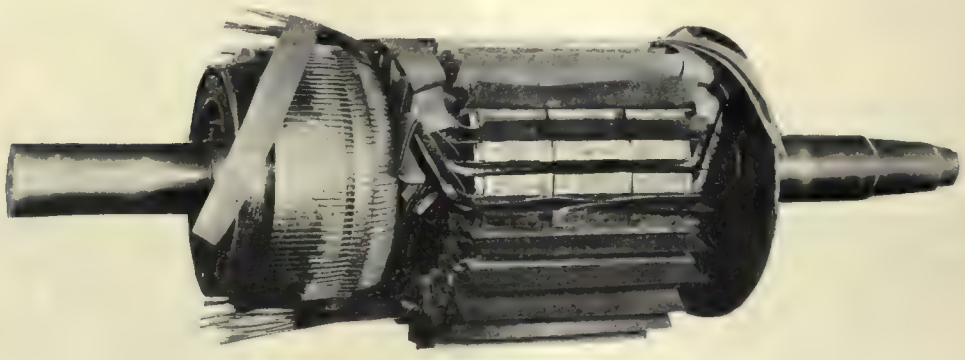
He served overseas from 1915 to 1919 with the Canadian army, in the motor machine gun corps and tank corps, returning to the Toronto Railway in 1919. The company was taken over by the Toronto Transportation Commission in 1921 and he was placed in charge of special construction work, such as the installation and operation of electric switches, signals, etc.

Mr. McAdam received his early education in the Toronto public schools and at St. Albans Cathedral school in Toronto. He is 37 years old.

Reducing Costs of

Armature Rewinding

By A. C. Roe
Renewal Parts Engineer Westinghouse Electric & Manufacturing Company



Careful insulation is essential at points where leads cross

Care should be taken to insure correct shape and the use of none except high-grade materials throughout. Proper insulation and reinforcement at vital points are important. Banding an aid in obtaining dependable service

ARMATURE repairs can be divided into two classifications, one including the mechanical group of cores, shafts, commutators, coil supports, fans, etc., and the second dealing with the electrical equipment, which includes the armature coils and the additional insulating materials necessary for protection of the coils and their leads from the core, from adjacent leads and all parts of the winding where either a difference of potential or a mechanical contact exists.

In the original design armature coils are considered part of the electrical winding. In almost every instance details are embodied that protect them from injury during installation. For example, in Westinghouse coils, a strip of fishpaper is placed on top of the upper half of the coil and under the finishing tape. This top strip is used only when tin strips are placed under all core bands, thus protecting the insulating material on the coil from mechanical injury.

A tight fit of the coils in the slots is required, and the coils therefore are allowed to project $\frac{1}{32}$ in. to $\frac{3}{64}$ in. above the top of the slots at the band grooves. The armature is heated and a temporary band applied while the armature is hot. This is called "hot banding," and pulls the coils down flush with the band grooves. Some means for protecting the insulation on the coils must be provided because considerable pressure is applied to a small area of the coil, thus causing a cutting action. There are three methods of applying protecting strips. These include: (a) short strips under each band on top of the coil, (b) a long strip the full length of the slot on top of the coil, and (c) a long strip on top of the coil and under the tape on the coil. Method (a) is subject to the criticism that the strip is likely to work out. With method (b) the strip is likely to become loose and bow up between the bands into the air gap. Both methods increase the time of the banding operation. Method (c) provides maximum protection with a minimum of expense.

All insulation applied during the installation of the coils can be classified as winding material, and this can be subdivided into two major groups, one including treated tape, friction tape, surgical tape, cord, twine, solder, banding wire, varnish, shellac and cements. This group can be termed "bulk material," as it is purchased in standard packages, or standard units, such as 50-100-lb. rolls of banding wire, 36-yd. rolls of tape, $\frac{1}{2}$-lb. balls of twine, etc., and each armature requires only a small fraction of the standard package, yardage or total weight.

The second important group includes all material cut or formed to a predetermined shape or size; such as winding cells, hoods, banding clips, strips under the end bands and under the leads, etc. All such items can be grouped under the term "cut winding insulation." Because of the method of applying these cut pieces, the classification "cut winding insulation" can be further subdivided into three minor groups, (1) cut core insulation, (2) slot and end insulation and (3) cut banding material. The material required to prepare the core for the armature coils is grouped together, as shown in an accompanying illustration. In addition, there are items needed when installing the coils, and while banding. It is seldom that one workman insulates the core, winds, con-

nects, solders and bands an armature. Therefore, the division and packing of the material into the three groups allow it to be distributed in the shop to better advantage.

Details of cut winding insulation are standardized by the manufacturers. This is of considerable value to the operating companies, because in most instances one cut piece can be used on a number of different types of armatures. For example, twelve graded sizes of tinned sheet steel clips take care of the banding of all types of armatures used on one large railway. Manufacturers distribute drawings for each type of armature, listing the cut pieces, and each piece has an identification number, so that the workman can select certain items and order them in large quantities. The armatures in any one shop can be grouped so as to use a number of standard cut insulation pieces that will apply to all, thus the ordering, stocking and using are simplified.

When insulating materials, such as fishpaper, treated cloth, oiled duck, etc., are purchased in standard 50 or 100-yd. rolls, 36 in. wide, and then stored in the shop where each winder cuts his own, a condition results that is not productive of economic maintenance.

Many sizes and shapes are needed to suit the different ideas of each winder and only a few pieces are cut at one time. Excessive waste of material when cutting a few pieces prohibits the use of the full quantity. Time is wasted as a workman could cut enough pieces for five or more sets in the same time as that required to cut a single set. Odd shapes and excessive lengths or widths necessitate trimming, which wastes the material and the winders' time, and inadequate facilities for cutting, shaping, assembling, etc., add to the time wasted. A larger stock assortment of grades and types of materials must be carried with such a method than is necessary.

Materials for Core Insulation

The purpose of core insulation is to interpose a barrier of insulating material between the armature coil and any metal part of the core that it may touch. This may be tape, special molded pieces, formed mica, or special shapes of treated cloth, fishpaper and mica, or a combination of these, depending on the type of coil and coil supports used. Materials are selected to suit operating conditions. Thus mica is used when the voltage is high, or when there is a temperature that is higher than class A insulation can safely withstand. To use the wrong material at any point, or to abuse or strain it during application, results in a waste of time and material. For example, by stretching bias-cut treated cloth, the tape varnish film and the seal between the fibers of the base materials are broken, thereby reducing the dielectric strength. Similarly, applying a thick wall of tape on a front or rear coil support will force the end windings up, and necessitate excessive band pressure and pounding. This strains the insulation on and in the coil proper, and burnt-out coils often are the result.

Another important factor in core insulation is the method and material used back of the commutator to support the leads. The space that requires filling is quite deep, and if soft, yielding materials, or materials that are affected by varying temperatures, are used, the supporting wall is weakened and broken leads generally result. Specially formed pieces of core insulation, such as wood collars for the back of commutators, and molded mica, or formed treated paper, coil support pieces, etc., have the advantage that they can be used repeatedly.

Slot and end insulation can make or mar a good winding job. There are numerous vulnerable places, which, if not protected properly, may develop into weak spots that ordinary testing will not show up but which will result in a pull-in later.



Winding the armature of a type 508-A railway motor

Armature coils should fit tightly both in the slots and on the end windings, therefore slot fillers are used. A winding cell protects the coil while it is driven into the slot. The double winding cell is a valuable help, as a thin, one-piece cell will pull down and crease under a tightly fitting coil. The double winding cell consists first of a bottom cell, that is, just wide enough to cover the bottom and each side of the bottom half of the coil. When winding the armature this bottom cell is sprung into a channel shape and placed in the top of the slot, or it can be placed around the bottom half of the coil. In either event, the winding cell, which is paraffined on both sides, and the coil are both driven down to the bottom of the slot together.

When the throw coils are in, a top winding cell, cut wide enough to project 1½ in. or more above the slot on either side of the coil, is placed in the slot over the bottom coil half. This provides additional insulation between coils and, also, the winder's time is conserved because all factory cells are paraffined on both sides, which eliminates the necessity of paraffining the bottom coil halves.

With the type of coil used in the Westinghouse Nos. 306 and 514 armatures, an oiled duck pad is used at the front and rear diamond points, and to obtain full protection a dummy piece should be used while each coil is drifted into place. After this, the coil-up should be eased up, the dummy removed and a new oil duck pad inserted. This assures that the protective pad will not be punctured at the point where the two adjacent coil ends cross. When there is considerable space between adjacent coil ends, filling strips are used and placed be-

tween the coils in a location that puts them directly under the end bands. These strips give a tight winding and prevent the collapse of the coil ends due to band pressure or pounding during winding.

Other vulnerable points are at the leads. Where four or five leads come from the bottom of the coil in one layer they must be changed to two layers between the coil and commutator. Here are two points where leads cross and change their plane. At the coil end a small rectangular piece of oiled duck is placed at the crossover point, and at the commutator, surgical tape is interwoven between the leads. The bottom and front end of the coils must be protected from the layers of bottom leads. Here again one piece of oiled duck protects three points. A small strip of fishpaper is used to protect the top leads from cutting into the top edge of the adjacent coil.



Set of cut winding insulation for a typical motor

There are numerous other cut insulation details that vary with the type of coil, voltage and operating conditions, but their proper location is indicated on the drawing supplied with each set of cut winding insulation, so that it is an easy matter for the workman to determine to what use each piece should be put.

Cut Banding Material

The banding operation is an important part of the winding or rewinding process. The main function of all bands is to hold the coils in place, and to make the coil ends compact and free from movement. This requires correct band pressure, size of wire, selection of materials, and shapes that will not change during operation.

Hot banding assures a tight band with minimum abuse to the winding. The armatures are heated in an oven at 105 deg. to 115 deg. C. until they reach a temperature of about 75 deg. C. The time required to reach this temperature varies with the size of the rotor. The approximate time for armatures up to 12 in. diameter is six hours, for armatures of 12 in. up to 30 in. diameter, eight hours, and above 30 in. diameter, ten to twelve hours.

Temporary bands are applied while the armatures are hot, the wire being started on the core to a set tension, and the rear end band started at the end of the core and then run out onto the end-winding, then back across the core to the front end. Protecting strips should be applied under end bands to protect the winding. The armatures are then dipped and baked. After cooling, the temporary bands are removed and the permanent bands are applied.

All light traction railway motor armatures of recent design have strips of tin under all permanent core bands, and in some instances strips of thin asbestos paper placed under the tin strips. To protect the front mica V ring, the mica should be cleaned and the ring sandpapered smooth. A coat of shellac, and a band of Italian twine should then be applied, the turns being kept tightly together. The twine should next be coated with shellac, using a hot iron to smooth in each coat. Two to four coats should be applied until the twine band is well filled. After sandpapering this surface, three or four coats of Westinghouse No. 672 cement should be applied. This can be made a part of the final banding operation.

All railway armatures should be preheated, dipped in a high-grade baking varnish and baked. The varnish should be held to a specific gravity of 0.850 plus or minus 0.005 for best results.

Proper testing is essential in the winding or rewinding of railway motor armatures. All armature coils should be tested for breakdowns between adjacent single coils and on multi-lead coils and a lighting-out test made to weed out crossed wires. After installing coils and connecting the bottom leads to the commutator on multi-lead coils, the winder should lightout the top leads for proper sequence. Before soldering, and after connecting, the armature should be tested for grounds and for short circuits.

A new test developed by J. L. Rylander of the motor engineering department of the Westinghouse Company is termed a "high frequency test." It consists of passing a high voltage at high frequency through the winding. This voltage varies from four times normal plus 1,000 to twice normal plus 2,000, according to the design, operation, voltage, etc.

The test shows up weak spots in the mica between bars, between turns, between adjacent coils at any point where they touch, between adjacent leads, between leads and front coil ends. In fact, the high frequency test searches out and reveals all weak spots and enables the insulation engineers to add material, change shape, or make other modifications to strengthen the winding at the points where it is required.



Section of track after concrete has been poured. Men in the foreground are trowelling off the finished surface

Shallow Steel Tie Construction

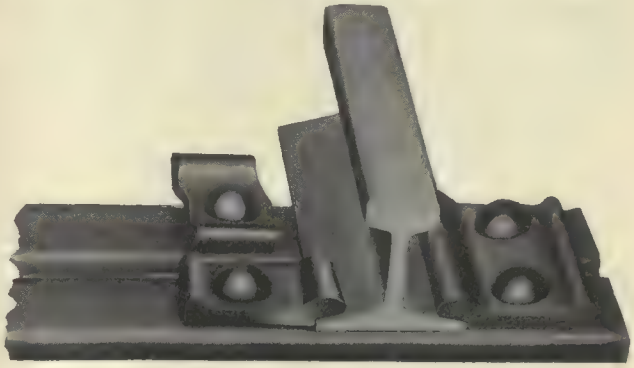
Used in Flint and Pontiac

Eastern Michigan Railways has installed economical type of track structure employing shallow ties originally developed for use in mines

RECENTLY the Eastern Michigan Railways was confronted with the problem of making extensive improvements to track in the cities of Pontiac and Flint. Passenger cars weighing from 15 to 25 tons, and freight cars having a gross weight as great as 55 tons, operate over these tracks. Before coming to any decision as to how the work should be done, a careful investigation was made of all the present-day types of street railway track construction. The chief points considered were cost, ease and speed of construction, paving surface, support of the rail, and the ability of the track to stand up under the vehicular and rail traffic that would pass over it. Another important consideration was the fact that the city engineers of the municipalities contiguous to Detroit require concrete under the ties in all paved track. The railway's investigations led to the belief that shallow steel ties spaced 2-ft. centers would give satisfactory results and economy in construction costs. It was, therefore, decided to use Bethlehem No. 3 steel ties.

COMPARATIVE COST OF WOOD AND STEEL TIE CONSTRUCTION

	Cost Per 100-Ft. Section
Wood Ties	
Excavation—87.52 cu.yd. at $1	$87.52
Concrete—79.29 cu.yd. at $10	792.90
One hundred oak ties at $1.47	147.00
Labor—spiking at 8 cents per foot	8.00
Spikes—400 at $6.90 per keg of 340	8.12
	$1,043.54
Engineering, superintendence, tools, etc. (10 per cent)	104.35
Total	$1,147.89
Steel Ties	
Excavation—63 cu.yd. at $1	$63.00
Concrete—63 cu.yd. at $10	630.00
One hundred steel ties at $1	100.00
Labor—installing at 14 cents per tie	14.00
Spot welding at 20 cents per tie	20.00
	$827.00
Engineering, superintendence, tools, etc. (10 per cent)	82.70
Total	$909.70
Saving	238.19
	$1,147.89



Shallow steel tie used by Eastern Michigan Railways, showing fixed and movable rail clips



Double track with ties and rails in place ready for concreting, the right-hand track utilizing steel ties and the left-hand track wood ties. Extra excavation necessary where wood ties are used is clearly seen. At the extreme left is a temporary track

During 1928 nearly 15,000 lineal feet of track was laid in this manner.

This tie is shallow in depth and is designed with the feature that all rail clips are fastened to it and ready for use. It was originally developed for use in mines. At each end are one wide clip held permanently in position with two large rivets, and two smaller movable clips which are also held in place with rivets. Ties of this type are shipped with the locking clips open and ready for immediate installation. All that is needed is a blow of the hammer to turn the locking clips into position. Another important feature of this tie is the fact that the stationary clip is on the outside of the rail at one end and on the inside at the other. This permits the installation or removal of ties without taking the track apart. There is a considerable saving in handling and distributing cost because of their light weight and small section, which reduces bulk in shipment.

The type of track construction used consists of 70-lb. A.S.C.E. relay rail with Thermit welded joints and Bethlehem No. 3 ties, 6 ft. 6 in. long, spaced 2-ft. centers. Tie clips are spot welded both to the tie itself and to the rail base to provide good cross bonding.

After the completion of the excavation and grading the rails were laid out and supported by three or four cedar ties to each rail. Temporary plates and two bolts were then laid out and either placed alongside the track excavation or slipped under the rail. Crews of four men, each supplied with two pinch bars and two mauls, were detailed to the job of installing ties. The duty of one man was to lift the tie up to the rails, after which it was held in place by the second and third men with the aid of the pinch bars. The fourth man then drove the tie over with a maul until the fixed clips engaged the base of the rail. Lastly this man hammered the movable clips into position. The tie was then in place in its proper position. A crew of four men installed about 125 ties a day. As the ties were installed the track was blocked up to the proper elevation and lined up. Welders followed the tie-laying crew and did the spot welding.

The concrete used is a 1:2:3½ mix, which is standard with the Michigan State Highway Department for one-course concrete and was specified by the city engineers. It was poured in one course from the bottom of the trench to the top of the rail, care being taken to have the concrete immediately adjacent to the rail heads and on the outside thereof ⅜ in. lower than the top of the rail to prevent double flanging.

No difficulties were encountered in the construction work on these jobs. Estimates of the cost of construction compared to conventional practice indicate an approximate saving of 20 per cent in favor of the track design used. In the six months that have elapsed nothing has developed that would give cause for any belief that this unusual type of construction is not satisfactory for the conditions under which it was installed.



Thermit welded joint with steel ties on both sides. This shows how the rail clips were spot welded to the ties



Track drains are supported in place by the lower flange on the steel tie. This construction is used also on the wood tie track

Electric Railway Journal Maintenance Data Sheet

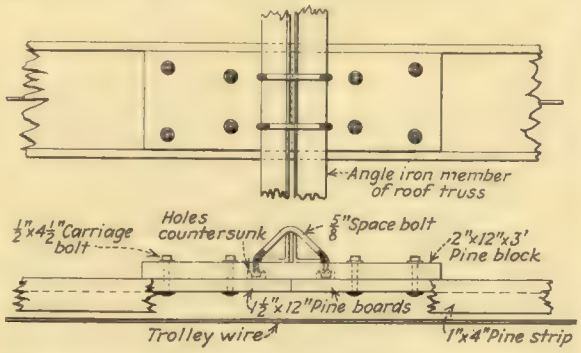
LINE DEPARTMENT—12

Trolley Troughs in Carhouse Reduce Fire Hazards*

By H. G. ENGELHARDT

New Orleans Public Service, Inc., New Orleans, La.

BURNING of the overhead wires in the carhouse of the New Orleans Public Service, Inc., caused by a trolley wheel leaving the wires and grounding on the steel roof beams, has been overcome by the use of pine troughs over all trolley wires inside the buildings. In the construction of these troughs a pine block 2 in. x 12 in. x 3 ft. is fastened to the metal roof truss by two U bolts made from standard ⅝-in. space bolts. The holes on the under side of the wood block are countersunk 1 in. to receive the nuts. To this block are bolted the ends of 1½x12-in. boards which extend from center to center of the roof trusses. Carriage bolts ½x4½ in. are used for holding these boards in place. The sides of the troughs are made from 1x4-in. strips nailed on. Center support for the trough is provided by the use of one or more guy wires suspended from an upper member of the roof truss to an eyebolt in the trough. A porcelain strain insulator is used in the guy. Hangers are spaced approximately 7 ft. apart. The completed trough is painted with a creosote compound. This procedure was adopted in accordance with the recommendations of the National Board of Fire Underwriters and contributes considerably toward a low premium for fire insurance.



Troughs used in carhouses of the New Orleans Public Service, Inc.

Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—22

High Rate Discharge Tester*

By F. W. BRAUND

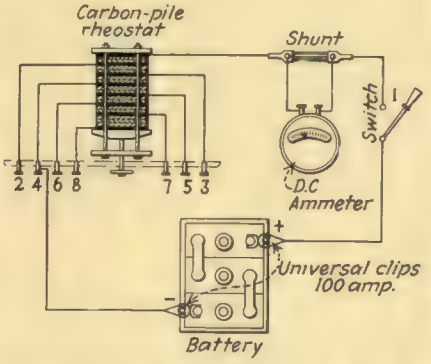
Superintendent of Power Conversion
Cleveland Railway, Cleveland, Ohio

UPON leaving the service station, a storage battery may show correct potential and gravity and still lack the high rate of discharge necessary to crank a cold engine of considerable horsepower. A high rate momentary discharge is necessary when the battery is mounted in a bus. For this reason the Cleveland Railway has built equipment for high rate discharge testing of batteries.

The top connectors of batteries are built of tinned copper straps with lead lugs on either end for burning to the element post of the battery. In the process of burning the strap to the post, or due to sulphation between the copper strap and the lead lug with the battery in service, the bond may be broken or partially destroyed between the copper straps and lead lug. This forms a high resistance joint that can be detected only by actual high rate discharge of 1,000 amp. or more.

Batteries used are either of the 6 or 12-volt type. In giving these a high rate discharge test the positive terminal is connected to a switch, the other terminal of which has a connection through an ammeter shunt to a carbon pile rheostat. Universal clips of 100 amp. capacity are used for quickly connecting and disconnecting the battery under test. In locating high resistance joints on a 12-volt fully charged battery the terminals 1 and 8 are used. In the event that a 12-volt battery is partially discharged, it is necessary to connect the negative terminal of either 5, 6 or 7 taps. With a fully charged, 6-volt battery, connections 1 and 4 are used, and with a partially discharged 6-volt battery, the negative is connected to terminals 2 or 3. When testing a single cell of a battery terminals 1 and 2 are used.

By means of a jumper used to connect terminals 2, 4, 6 and 8 in parallel, and a second jumper to connect 1, 3, 5 and 7, the carbon plates can be placed in parallel so as to give an extremely high rate of discharge.



Testing equipment used for high rate discharge testing of batteries

Taps	Resistance
1 to 2	0.1200 ohm
1 to 3	0.0793 ohm
1 to 4	0.0737 ohm
1 to 5	0.0620 ohm
1 to 6	0.0415 ohm
1 to 7	0.0169 ohm
1 to 8	0.0084 ohm

Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

LINE DEPARTMENT—13

Portable Rope Reel*

By Angus G. Scott
Assistant Superintendent of Overhead Lines
The Cleveland Railway
Cleveland, Ohio

TO FACILITATE the handling of large coils of rope, such as are used by electric railway line departments, a reel of the type shown in the accompanying illustration is used by the Cleveland Railway. This provides for 1,200 ft. of rope and can be moved readily from one location to another. A small metal brake band is part of the equipment. To facilitate winding, the sides are left open. Ford automobile wheels, mounted on a specially made axle, are used. Tires are of hard rubber.



Type of portable reel used by the Cleveland Railway

Before this reel was devised rope was wound on an ordinary trolley reel or done up in large coils and tied. Both these methods made handling difficult. The reel offers many advantages. It can be towed easily, handled by a single man and can be set up in practically any location.

**Submitted in* Electric Railway Journal *Prize Contest.*

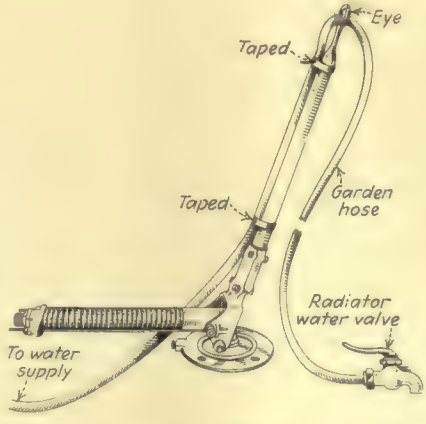
Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—23

Radiator Filling Station for Buses*

By Arthur E. Clegg
Foreman Electrical Department San Diego Electric Railway
San Diego, Cal.

TO PROVIDE a convenient method for filling bus radiators, special equipment has been devised by the San Diego Electric Railway. The device consists of a U. S. No. 6 form A trolley base mounted on a bracket and a pole which has an eye at the top end through which the filling hose passes. One end of the hose is attached to the water supply line while the other is provided with a radiator water valve. The hose is fastened to the pole of the trolley base by means of friction tape. This device is placed at the entrance to the gas filling station at the company's garage and is located high enough to clear buses as they move in and out in regular service.



Equipment used in radiator water filling stations by the San Diego Electric Railway

A wall hook is provided to hold the water valve. With the trolley pole in its normal position the hose is just long enough to allow conveniently hooking of the valve in position. While buses and other auto service equipment are being serviced for gas the radiators can be filled quickly with water by pulling the trolley pole down so as to give necessary length of hose to reach the radiators of various types of equipment. The simplicity and convenience of the radiator water filling station has effected a big time saving.

**Submitted in* Electric Railway Journal *Prize Contest.*

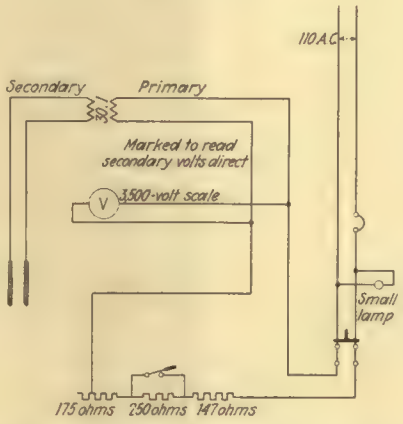
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—63

Simple High-Potential Test Set*

By H. J. Beadle
Equipment Engineer Dallas Railway & Terminal Company
Dallas, Tex.

BY THE USE of a transformer test set built by the Dallas Railway & Terminal Company many defective rewinding jobs have been detected before armatures were put back in service. The set cost approximately $55 and since its use it has paid for itself many times by detecting weak spots in the insulation which ultimately would have caused trouble in service. The equipment used consists of a transformer, circuit breaker, switch, voltmeter and regulating rheostat. The transformer has a ratio of 30:1. The circuit breaker is connected in series in the line and is rated at 1 amp. A red light is connected across the line and is used as a warning signal. The rheostat is divided into three sections of 175 ohms, 250 ohms and 147 ohms. The 175-ohm section is variable and is used to change the secondary voltage. A test voltage of 1,500 is used for old jobs which are dipped and baked, and 2,000 volts is used for rewinding jobs. The potential is applied for one minute.



Wiring diagram for high-potential test set

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

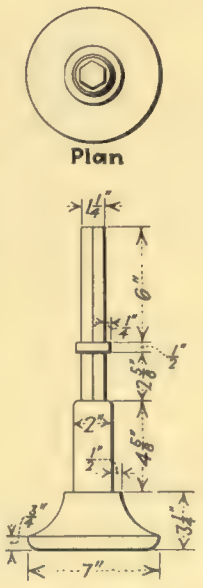
TRACK AND WAY DEPARTMENT—42

Heavy Tamping Pads*

By Louis T. Botto
Superintendent Maintenance of Way Department
San Antonio Public Service Company
San Antonio, Tex.

EXCELLENT results have been obtained through the use of heavy tamping pads in air-operated concrete breakers by the San Antonio Public Service Company, San Antonio, Tex. Some difficulty, however, was experienced, due to the commercial tamping pads not being of sufficiently rugged design to stand up for any length of time under the 80 lb. pressure applied by the concrete breakers. Experiments were made and, as a result, a special tamping pad has been designed, much stronger than that previously used. This does the work required of it without breaking.

After rolling the track sub-grade with a 7-ton steam roller, these tamping pads compact the soil from 1 to 2 in. and are invaluable in tamping around pipes, manholes and approaches to bridges. They are also used in tamping concrete and in consolidating gravel between the ties in gravel ballast tracks.



Special reinforced tamping pads used by the San Antonio Public Service Company

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—64

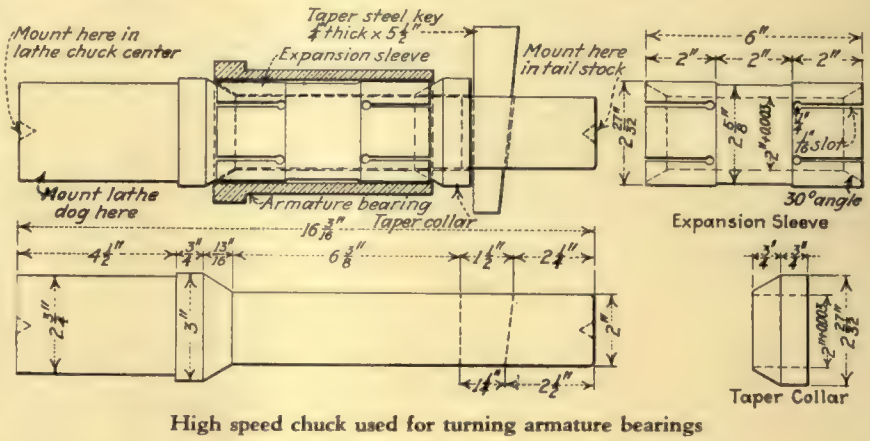
High Speed Chuck for Armature Bearings*

By Charles Herms

General Foreman San Diego Electric Railway
San Diego, Cal.

On car equipment operated by the San Diego Electric Railway it has been found that the life of armature bearings for the modern high speed motors with helical gears is 50 per cent less than that which is obtained for low speed spur gear type motors. As a result, particular attention must be given to keeping maintenance costs of these bearings as low as possible. To facilitate this work several special chucks and jigs have been made. The accompanying illustration shows a high speed chuck used for turning armature bearings.

In using this, the first operation is to chuck the bearing in a Universal chuck and bore the inside to exact size with a boring bar. In the second operation, the bearing is slipped over the expansion sleeve of the high speed chuck and the taper collar is driven firmly into place by striking the taper key a light blow. This expands the sleeve and centers and chucks the bearing automatically. The whole assembly is then installed between lathe centers by screwing up the tail stock a few turns. The chuck is driven by means of the lathe dog which always remains on the chuck shaft. The lathe chuck jaws are not used because this would require an additional operation. The entire operation requires only 30 seconds.



High speed chuck used for turning armature bearings

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

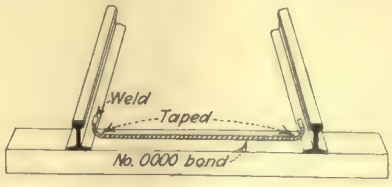
TRACK AND WAY DEPARTMENT—43

Taping of Bonds Prevents Electrolytic Action*

By Charles F. Coyle

Assistant Engineer Overhead Line Department
Memphis Street Railway, Memphis, Tenn.

Considerable trouble has been experienced because of electrolytic action where cross bonds are in contact with the earth on the lines of the Memphis Street Railway. To overcome this difficulty it is now the practice on open track construction to tape all cross bonds to a point as near as possible to the weld. After taping they are painted carefully with an insulating paint. This method of taping bonds has proved very successful in reducing the amount of trouble from this cause. The tape also conceals the bond to a certain extent and so has reduced the loss of bonds due to theft. The accompanying sketch shows the method.



Method used for installing bonds on the Memphis Street Railway

**Submitted in* Electric Railway Journal *Prize Contest.*

Prolonging the Life of Electric Railway Armatures

Yearly dipping and baking is a desirable practice. Correct selection of varnish important. Careful temperature control needed

By R. S. Beers
Railway Engineering Department General Electric Company

IN THE maintenance of railway motors it is an accepted fact that dipping and baking of armatures and field coils when they are rewound or overhauled is the best method of increasing their life. As the varnish gradually loses its solvent, because of repeated heating and cooling, it is essential that the dipping and baking be repeated from time to time. While best results will be obtained by a yearly dipping and baking, comparatively few railways have an overhaul program that brings the apparatus through the shop so frequently. The usual practice is to dip and bake the armatures and field coils when the cars go through on a general overhaul.

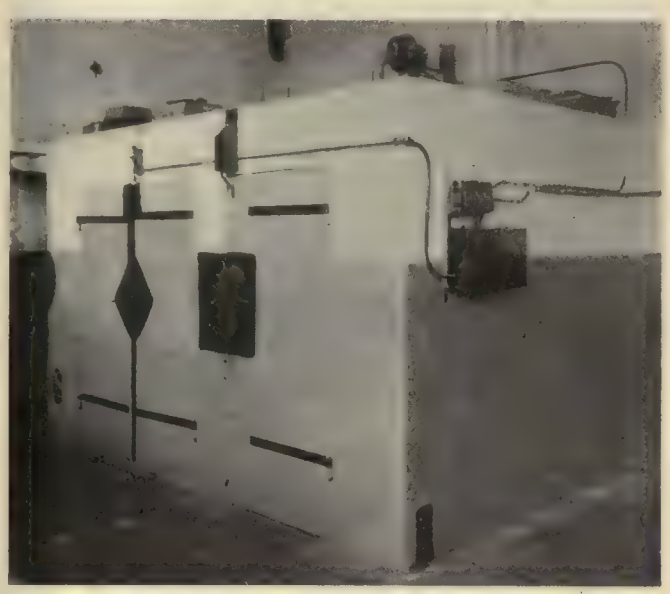
A concrete example of how rewinds were reduced on one railway by dipping and baking is given in the following tabulation:

Year	Armatures Dipped	Armatures Rewound
1924	94	266
1925	106	220
1926	128	163
1927	173	155
1928 (ten months)	304	86

On this property baking and dipping was started in 1924. The greater number of armatures dipped in 1928 is the result of a definite overhauling program that includes the dipping and baking of all fields and armatures every two years. The purpose of dipping and baking is twofold. One is to put a waterproof covering over the insulation of the armature; the other to prevent movement of the armature coil by filling the spaces between it and the slot. Before dipping, the armature is heated to free it from moisture, and to warm the insulation so the varnish will penetrate easily. Temporary binding is applied at this time to insure a tight final binding.

Two general methods of dipping armatures are in vogue. One method is to rotate the armature through a shallow pan of varnish; the other to use a tank of varnish and lower the armature, with its pinion end down, until the varnish is within ¼ in. of the ear on the commutator segment. The armature is left in the varnish from 10 to 30 minutes, or until the bubbles cease rising.

It seems reasonable to expect that, when an armature has been dipped, the varnish will penetrate the minute openings in the coil insulation to a greater depth and in a more successful manner than when the armature has been rotated in a shallow pan. This is borne out by the fact that it requires a shorter time to bake an armature that has been rolled in a pan than one that has been dipped in a tank.



Baking oven in the shop of the Schenectady Railway

A few operators submerge the entire armature. The advantage claimed for complete submersion is that it closes small holes in the commutator shells, preventing oil from entering the commutator and short circuiting its bars. The disadvantage is that a much longer baking time is needed because varnish gets into the commutator, mica cones, etc. The canvas head dressing should be removed before dipping, as the varnish either does not penetrate or else fills the spaces under the dressing, necessitating a long time for baking.

After the armature is soaked full of varnish it should be removed from the dip tank and allowed to drain until the varnish stops dripping. If it has been dipped in a vertical position, draining should be with the shaft at about 30 deg. from vertical. When dripping ceases the armature should be turned half-way around, whereupon dripping will start again. The varnish may be washed off the bearing and pinion fit with gasoline while the armature is draining. If it bakes on, a paint remover should be used to clean it off.

For the best results it is essential to use a varnish that will remain flexible for a long time without cracking. Baking varnishes fulfill this requirement much better than air-drying varnishes, because the former retains its solvent at ordinary temperatures much longer than does an air-drying varnish. For the same reason, a baking varnish must be baked a longer time than an air-drying one.

Whether a clear or black baking varnish should be used is largely a personal preference. Good results may be obtained with either. As a matter of fact, the majority of railways use a black baking varnish for railway motors. It is obvious that a thin liquid will pene-



Tension device on armature banding lathe

trate the windings of an armature much deeper than a thick one. Likewise, if the liquid is all solvent, there will be very little solid matter left after baking to form a waterproof covering or to act as a filler and keep the coils tight.

The specific gravity of a varnish is measured at 70 deg. F. with a hydrometer divided in a decimal scale. The specific gravity used for brushing is 0.860. For dipping, a specific gravity of 0.835 to 0.845 is customary. As the specific gravity changes with temperature it should be measured with a hydrometer that includes also a thermometer. While the gravity of varnishes is given at 70 deg. F. a variation of 10 deg. plus or minus is immaterial for all practical purposes. As the hot armature is put in a relatively small quantity of cool varnish, the latter is thinned further by the heat from the armature. The best penetration of varnish into the armature windings will be when its temperature is above 110 deg. F.

An approximate means of estimating the amount of gasoline thinner, when this is suitable, for each 100 gal. of varnish is given in the accompanying table.

GALLONS OF GASOLINE THINNER FOR EACH 100 GALLONS OF VARNISH

Observed specific gravity		0.870	0.864	0.859	0.854	0.849	0.843
Desired specific gravity.	0.849	17	13	9	4	0	.....
	0.843	23	18	14	9	5	0
	0.839	28	24	19	24	9	5
	0.833	35	30	25	20	15	10

While two dippings and bakings are better than one, it is customary practice for the railways to dip their armatures only once, whether they are being rewound or overhauled. When baking armatures it is necessary to have an oven temperature high enough to remove the moisture, but not high enough to weaken the cotton insulation. The usual oven temperature ranges are between 220 deg. F. and 235 deg. F. for railway work.

Inasmuch as the temperature inside the oven may vary as much as 50 deg. between the floor and roof, it is best to place thermometers on the armatures and then move the thermostatic control device up and down the side wall of the oven until a location is found that gives the desired temperature at the armature. Successful baking requires an adequate supply of fresh air for the oven to insure quick drying of the varnish and to prevent the mixture of solvent (gasoline) and air from becoming explosive. Either natural or forced ventilation may be used, the latter being the better. There should be an outdoor discharge for the mixture of solvents and air removed from the oven.

To free armatures of moisture they are heated for ten or twelve hours before dipping. The usual practice is to put the armatures in the oven at night and dip in the morning. After they are dipped, drained and returned to the oven for the final bake, varnish will still run out when the armature heats up. For this reason the best practice is to set it in a vertical position with the pinion end downward; otherwise, with ventilated motors, the varnish may close the air ducts partially. Some of the old motors, such as GE-67, GE-73 and GE-80, bake better in a horizontal position because of a pocket between the commutator and core which does not empty with the armature in a vertical position. Armatures that are baked in a horizontal position should be given several quarter turns during the first few hours of baking to insure draining varnish pockets.

The General Electric Company's practice is to dip and bake railway armatures twice. After the first dip all armatures are baked twelve hours at an oven temperature of 230 deg. F. to 235 deg. F. After the second dip, the wire-wound ones are baked at least twelve hours and, if necessary, enough longer so they have an insulation resistance of at least ½ megohm while at oven temperature. The bar-wound ones are baked a minimum of 24 hours, or until the insulation resistance is 1 megohm while hot. The majority of railway companies bake armatures for a definite length of time. This is not a successful measure, however, as one discovers quickly when insulation resistance measurements are made.

The insulation resistance test is simple and can never harm a piece of apparatus as a high potential test might. A megger, measuring insulation resistance directly in megohms may be used; or a 750-volt switchboard-type voltmeter will give equally good results for about one-third the price of the megger. It is recommended in all cases that the two measures, minimum length of time and minimum insulation resistance, be used for baking armatures.

A minimum length of time is needed to solidify or "jell" any small pockets of varnish that have not drained. The time depends on oven ventilation, kind of varnish, oven temperature and size of armature. For these reasons it is best to determine it for each oven. A simple method is to put a cup in the oven with ½ in. varnish in it. The number of hours that it takes to "jell" should be determined so it will not run when cold. To this should be added the time it takes to heat the armature up

to oven temperature after it comes out of the dip tank to determine the minimum baking time.

All dipping and baking of armatures should include temporary binding of the armature coils. Such a procedure pulls the coils into place and insures a tight final binding that cannot be accomplished in any other way. The tighter the coils are bound together the less movement there is between them. Reducing the movement between adjacent coils prevents their chafing and breaking the varnish seal on the surface.

The procedure followed in temporary binding is to heat the armature overnight in the armature oven to soften the coils and insulation so they are pliable and will not break. The armature is put in the banding lathe while hot, and the temporary binding put on. One-sixteenth inch pressboard, or similar cushion, is used between the wire and the coil ends. Along the slot portion wood or metal pieces, of the width and thickness of the armature coil and a little longer than the armature core, are used between the binding wire and the coils.

Usually the temporary binding is started at one end of the armature and continued to the other without break. On the wood sticks along the core it is spiraled, with a distance of about ½ in. between adjacent wires. Judgment must be used in applying the binding over the coil ends; too little binding does not pull the coils down properly, and too much with the cushioning material provides pockets that prevent the varnish draining properly. The final binding is put on with the armature cold and after the dipping is completed.

Binding wire tension should be measured with some indicating device to insure uniform results. The tensions used should depend on the wire size and whether the armature has been rewound or overhauled. As a general guide, binding wire 0.045 in. in diameter (No. 17 B. & S. size) is suitable for railway motor armatures of 65 hp. and smaller. The tension on this size wire for rewound armatures should be from 150 to 200 lb. This tension is too high for overhauled armatures and should be reduced to from 80 to 120 lb. For armatures larger than 65 hp. 0.057 in. diam. binding wire (No. 15 B. & S. size) may be used. The tension on this size wire for rewound armatures should be 250 to 300 lb. and for overhauled ones 175 to 225 lb. The tension should be the same for either temporary or final bindings.

Louisville Improves Its Safety Record

AFTER winning the Brady Safety Medal for Class "A" companies a year ago for its 1926 record, the Louisville Railway made an even better safety record in 1927. While it did not receive the Brady prize this year, it entered the contest, and its brief gives an instructive account of how this lower accident record was obtained, and what has been done for safety during the last year on a property which has given a great deal of attention to that subject for a long time.

Among the mechanical aids to safety added during 1927, the company gives first position to a steam railroad grade crossing elimination program, begun in 1927. Although, of course, it will be years before all the benefits can be secured, the city has authorized a bond issue of $5,500,000 to pay its proportion of the cost.

Two more new illuminated "car turn" signs have been installed at intersections where street cars make right-hand turns, and destination signs, with black letters 3 in. to 5 in. high on an aluminum painted background, have been prepared for all cars. It is thought they encourage waiting passengers to stay on the sidewalk out of danger until it is time for them to step forward to board a car. It is further believed that their installation has resulted in fewer passengers being struck by automobiles, when boarding or alighting from street cars.

Locking devices on electric switches, to prevent the split switch hazard when cars follow each other closely, are now in use on 31 of the 64 switches on the property. Shock absorbing springs and special lug rods have been added to all electric switches between the switch tongue and the electric device to reduce the impact of the armature of the switch magnet when operated and to improve the functioning of the switches. An order has been issued that motormen are not to use sand while passing over switches. Employees not on duty are not permitted to ride in the front vestibule of cars except when giving instructions to new men or when the cars are crowded.

A steam connection has been provided at the power house to melt the ice that accumulates in the cinder hopper in cold weather. A railing has been put around the hopper for workmen to hold on when cleaning the chute. Conductors, after giving the motorman the "go ahead" signal, are not allowed to open the car doors for more passengers even when their motormen are unable to proceed because of traffic conditions.

Monthly surprise inspections are now made to every piece of company property by a committee consisting of a power house man, a track man, a lineman, a motorman, a conductor, a shop man, an employee from the general office, the director of safety, and the secretary of the co-operative association. Machine guards and lighting conditions are examined, with the idea of making all property as nearly fool-proof as possible.

Several improved practices have been introduced for the improvement of conditions for the trainmen. One is in connection with street car hold-ups, of which there have been several in Louisville. Orders were issued that trainmen held up should do nothing to imperil themselves, and the company arranged for group hold-up insurance by which each man insured is protected to the amount of $50, no distinction being made between his personal property and that of the company. Every trainman who wishes it may obtain this insurance. It costs $2.50 a year, half of which is paid by the trainman and half by the company. Another plan, adopted largely for the same reason, is to pay wages by check rather than by currency.

Another change was the rearrangement of the electric heaters on one-man cars. When receiving fare or making change, operators of such cars cannot wear gloves, and as considerable cold air enters the doors when they are opened for boarding and leaving passengers, the operator's hands become chilled. This discomfort has been minimized without ill effect on the general car ventilating and heating problem by moving the electric heaters forward in all one-man cars.

Another improvement, which is in the direction of

sanitation if not of safety, is the attachment of trash baskets to all cars. Prior to their installation, the regulations required that cars be swept out at the end of lines and the waste paper deposited in tins placed at loops for the purpose. In practice this worked out imperfectly. The trainmen would sweep their cars out, but instead of putting their trash in these receptacles it would often be swept on to the ground. Now a trash basket is placed under the floor of every car, and waste matter may be swept into it even more easily than through the door.

The extended attention which the company has given to the safety training of trainmen gives an especial value to its experience on this topic. It has found little difficulty in interesting its employees in safety or in persuading them in every way to co-operate for safe operation and that they retain this interest, when it has once been acquired. Unfortunately, it finds that this alone is not enough. It believes that the interest of trainmen in safety should be a part of their conscious, rather than their subconscious, lives. The motorman with the highest safety ideals may run over a pedestrian or smash an automobile if he momentarily relaxes his vigilance. The management, therefore, must keep the monotony of daily tasks from dulling the safety enthusiasm of the trainmen. This is the reason for the accident contests between the divisions which have been maintained in Louisville for years. Each month's contest is a new thing, and the position of different carhouses in the contest frequently changes from day to day. These ostensibly new factors naturally become topics of conversation around the carhouses and help to keep safety constantly in the minds of the men.

Two improvements, drafted on the original plan for safety contests, have done much to keep at a minimum the inevitable less-enthusiastic moments. The first of these is the election each month by every carhouse of a safety captain, who acts as leader during that month's contest. The employee elected naturally takes on these duties in addition to his other work. No extra wages are paid to any safety captain, but election to the position is esteemed an honor, and every safety captain gives generously of his own time in an effort to improve the record of his carhouse, so that it will be the winner in the contest.

The company also finds that by occasionally changing the manner of posting the standing of the several competing teams, it can increase the interest of its employees in the contest and in safety. Hence, the enthusiasm of any indifferent individual is revitalized. There is a great advantage also in having every employee at the carhouse acquainted with its standing. The most machine-like person is not wholly impervious to an *esprit de corps,* and, if his carhouse has a chance to win a monthly contest, he naturally will make just a little greater effort not to destroy that chance by having an accident.

Besides these carhouse contests, another element of competition is introduced through an award founded by a director of the company, consisting of an annual cash prize of $25 and a gold medal to the employee who during each calendar year renders in his individual capacity the most efficient or useful service to the company. To the winner of this prize, the company gives a trip to the A.E.R.A. convention. Three different men have received this award since it was established, and in each case safety of operation has been a very important factor in determining the prize winner.

Maintenance of Aluminum Cell Lightning Arresters

By F. J. Foote
Superintendent of Motive Power and Equipment
Indiana, Columbus & Eastern Traction Company

MUCH trouble from lightning has been experienced by the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, particularly on one line. After considerable experimenting this line was completely equipped with aluminum cell arresters. The results were immediate and the trouble from lightning was entirely eliminated. This led to the eventual adoption of these arresters on all lines of this company and on all feeders, the feeder arresters being located inside the substation.

Arresters are not used on the trolley wire but partial protection is secured from a circuit of 25-watt incandescent lamps at each switch, one of which is in the switch lamp for signal purposes. These lamps are connected between the trolley and rail at all times. Occasionally, during an electric storm, some of these lamps are burned out.

Maintenance of these arresters is comparatively simple and consists of cleaning all parts and renewing the electrolyte every spring, with inspection every few days to see that the fuse is not burned out. Sometimes, when cleaning the cell, it is found that one or both of the aluminum plates are eaten away so that renewal is necessary. When cleaning the cells and renewing the electrolytes absolute cleanliness is important. It is equally important that suitable electrolyte be used. Since these precautions have been taken considerably fewer renewals of plates and a much better arrester performance has been noted. Electrolyte ready mixed at the factory has been found much superior to that which can be made up from electrolyte powder.

It has been found advisable to remove the cells from all arresters on the cars in the late fall, cleaning and repairing them and putting them in storage until early spring. In the cleaning process clean warm water and Ivory soap is used, rinsing thoroughly in clean distilled water. Care is taken that the plates are not touched with the fingers after rinsing. It facilitates matters greatly to have a sheet of glass kept clean, to set the plates on after rinsing. If the cells are cleaned in the fall they should be again rinsed in distilled water in the spring before filling with electrolyte. It has been found that all of these precautions are necessary if the best results are to be secured, and it is probable that where these arresters have not proved satisfactory, it is largely because of too little attention being given cleaning and repairing.

The feeder arresters in the substations are not removed in the winter. They are inspected for blown fuses frequently during the summer months and are cleaned and repaired every spring. During the last two years several of these arresters have been installed across the direct-current brushes of rotary converters, and it is believed that this has reduced the number of flashovers. All of these arresters are connected directly between the line and ground without air gap. Consequently, there is at all times a minute current passing through the arresters, making special charging unnecessary. These electrolytic condensers possess considerable electrostatic capacity and for this reason the elimination of radio interference, due to motor cars and rotary converters, is another advantage, as these arresters act as condensers across the line.

Ideas for Better Maintenance

Turntable for Heavy Field Coils

BECAUSE of their delicate construction heavy field coils are often damaged by handling in the shop. At the Deer Lodge shop of the Chicago, Milwaukee & St. Paul Railway, the handling and possible damaging of field coils weighing as much as 300 lb. is avoided by the use of a small turntable. This turntable



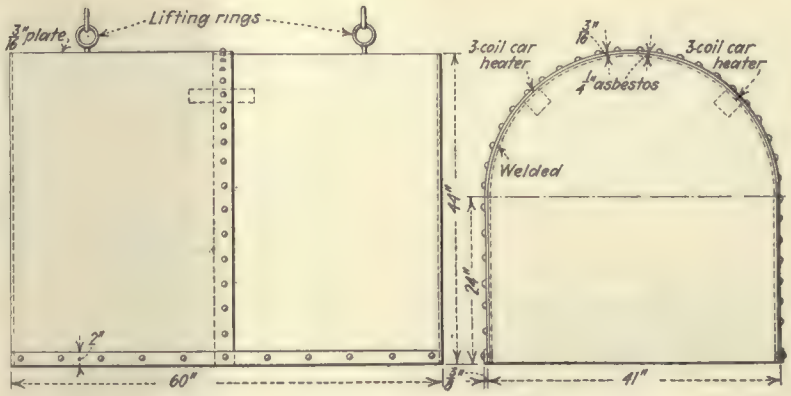
Turntable facilitates handling of heavy field coils

consists of a heavy wood base on which is mounted a circular disk cut from steel plate by means of a welding cutter. On this plate are mounted four iron brackets which may be placed in several positions to accommodate various sizes and shapes of coils. By the use of this device the position of the field coil may be altered to give the best working conditions at all times, at the same time movement can do no damage to the coil itself.

Portable Pit Oven for Limited Space

WHERE shop floor space is limited and ample pit space is available a portable baking oven designed for installation in a pit will be found advantageous. This condition existed in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y.

The oven shown in the accompanying sketch was designed and constructed in the shop for pit operation. It is 60 in. long, 44 in. high, 41 in. wide and made of $\frac{3}{16}$-in. plates. The top and sides are made from two semicircular plates overlapped and riveted at the center with $\frac{3}{8}$-in. rivets. The end plates are in one piece and are welded to the top and side plate of the oven.



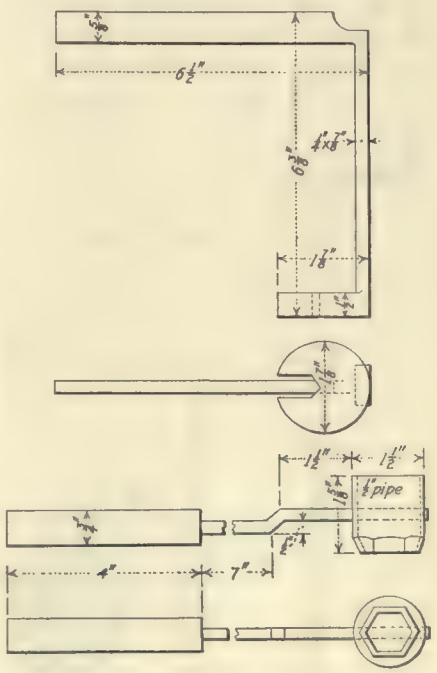
This oven is installed in one of the shop pits

Additional strength is obtained by a $\frac{3}{8}$x2-in. bar riveted to either side at the bottom. The entire oven is lined with $\frac{1}{4}$-in. asbestos. Thermostatically-controlled heat is obtained from two car heaters installed near the top. Two strong rings welded to the top provide for lifting. The armature to be baked is placed in the floor of the pit and the oven is placed over it.

Useful Air Equipment Tools

OFTEN it is impossible to purchase special wrenches for specific work and much time is lost in using standard tools. This condition existed in the air equipment maintenance organization of the Richmond Railways, Inc., Staten Island, N. Y. Trouble was experienced in removing the caps of the M-28 brake valves and foot valves. This increased the costs for maintenance of this equipment. The special wrenches shown in the accompanying sketches were designed by Air Equipment Inspector Nicksic to overcome this trouble. The upper illustration shows the construction of the wrench adopted for the removal of the holding bolts of the brake valve cap, and the lower one that of the wrench for the removal of the foot valve cap.

The handle of the brake valve wrench is $6\frac{1}{2}$ in. long and is made from $\frac{5}{8}$-in. round material. The vertical portion is flattened to a section of $\frac{7}{8}$x$\frac{1}{4}$ in. and is $6\frac{3}{8}$ in. long. The length of the jaw stock is $1\frac{7}{8}$ in., the width $1\frac{7}{8}$ in. and the thickness $\frac{1}{2}$ in. The handle is rotated over the valve stem so that a free circular movement is obtained irrespective of the manner in which the valve is mounted to the dash. The foot valve cap wrench socket is made from a piece of $1\frac{1}{2}$-in. pipe $1\frac{5}{8}$ in. long. Both walls of this are drilled with a $\frac{1}{2}$-in. hole and riveted to a $\frac{1}{2}$-in. round handle $10\frac{3}{8}$ in. long. This has a $\frac{1}{2}$-in. offset $3\frac{3}{8}$ in. in the end. The end of this rod is fitted with a round grip 4 in. long and $\frac{3}{4}$ in. in diameter.

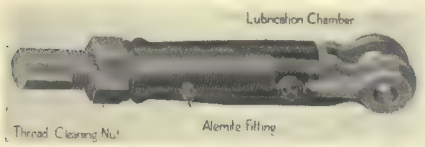


These wrenches have provided a means for removing and installing caps quickly. Above, brake valve wrench. Below, wrench for foot valve

Improved Equipment Suggestions

Brake Rod Turnbuckle

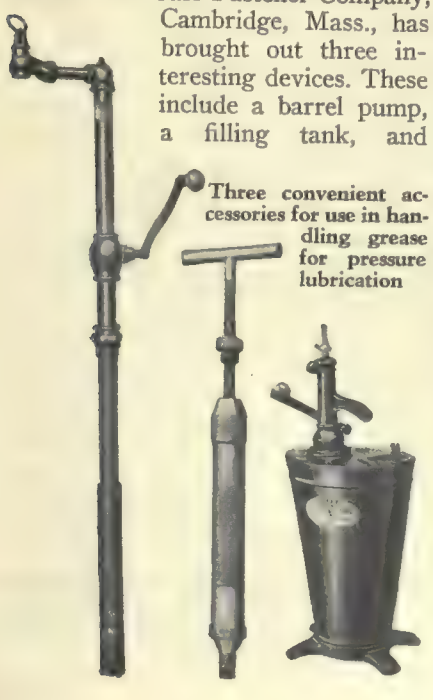
WITH the object of keeping threads clean and providing lubrication the J. G. Brill Company, Philadelphia, Pa., has designed an improved type of brake rod turnbuckle. The accompanying illustration shows the closed end which has a lubrication chamber with plug for filling. An Alemite fitting is arranged to supply lubricant to the threaded section. On the outside a nut is provided for cleaning the thread. With this in position the thread which is next to be used is kept clean, as it enters the turnbuckle.



Improved type of brake rod turnbuckle

Accessories for Pressure Lubrication

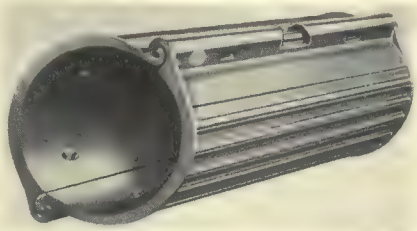
WITH the idea of providing convenient means for handling grease between the steel drum in which it is received and the bearings to which it is applied, and to keep grease clean while it is being removed and applied, the Dot Lubrication Division of the Carr Fastener Company, Cambridge, Mass., has brought out three interesting devices. These include a barrel pump, a filling tank, and a hand gun. By use of the barrel pump the greaser puts 25 lb. of lubricant into the hand filling tank. This latter is an airtight dustproof tank and is arranged to be carried conveniently about the shop. The hand gun is filled from the carrying tank and is used for forcing the lubricant into the pressure fittings. With these three pieces of equipment dirt is kept out of the lubricant and convenient handling is provided.



Three convenient accessories for use in handling grease for pressure lubrication

Sleeve for Reinforcing Poles

FOR repairing steel poles when they have become corroded at the ground line, the Ohio Brass Company, Mansfield, Ohio, is marketing a reinforcing sleeve. It consists of two ribbed segments of malleable iron, heavily japanned, tongued and grooved at the outer edges and long enough to project well above and below the ground line. The space between the pole and the sleeve, formed by a series of lugs on the inside of the sleeve, is filled with cement so as to give uniform bearing surface and make an airtight seal. The excavation outside the pole sleeve is usually cemented flush with the surface.



New type of sleeve for repairing corroded steel poles

Improved Welding Gloves

GAUNTLET gloves of a soft and pliable suede leather, specially treated to prevent heat from affecting them, have been added by the Oxweld Acetylene Company, New York, N. Y., to its line of accessories for welding and cutting. A leather strip on the thumb seam and a semicircular reinforcement on the inside seam, adjoining the palm, reinforce the glove. The left glove has a leather reinforcement covering the entire back for protecting the back of the left hand during work.

Earth Boring Machine and Pole Setter

A COMBINATION earth boring machine and pole setter has been placed on the market by the Highway Trailer Company, Edgerton, Wis. It will traverse and operate in thick underbrush where it would be impossible for man to go on foot, no skids being required. It operates in ditches, knolls, hollows, embankments, reaches and digs, and sets the pole in any kind of soil and all kinds of weather. In addition to digging straight holes it will dig at any angle, which is a time saver in digging anchor holes suitable for all types of anchors.



Setting a pole with the machine

The setting of poles at the time holes are dug, also the possibility of dragging poles to a position so they can be hoisted in position, is possible by using the cable supplied from the winch which is controlled from the driver's seat. The winch is driven from a power take-off, which is sturdy in construction, and is fully capable of taking full engine torque.

The pole derrick is 17 ft. in length, made of 3½-in. diameter 40-carbon seamless steel tubing, and is capable of setting poles 45 ft. in length.

The highway earth boring machine is largely used with a 20 ft. auger but is capable of handling augers from 8 in. to 24 in., the latter under favorable conditions.

News *of the* Industry

Jitney Regulatory Measure Upheld in Detroit

Detroit's so-called jitney ordinance was again sustained on Feb. 2 when the Michigan State Supreme Court upheld Judge Merriam's decision in the Circuit Court that the city cannot be restrained from enforcing the jitney ordinance. The decision of the State Supreme Court bench was unanimous.

The matter at issue was the old ordinance prohibiting jitneys from operating on only certain stated streets, but jitney men hoped to establish a ruling which would have opened the way to crippling the proposed ordinance which is to be voted on at the April election. If adopted at the referendum this ordinance will ban jitneys from all city streets.

It has been pointed out by city officials that this latest court decision, together with the Supreme Court ruling in October last, holding that a municipality has the right to regulate the use of its streets, means that jitneys will never run again in Detroit unless by express wish and order of the people in an election.

Permanent Rate for St. Paul—Comment from Minneapolis

The Minnesota Railroad & Warehouse Commission made permanent on Feb. 7, the emergency rate of fare for the St. Paul City Railway as 10 cents cash and six tokens for 45 cents. This emergency rate was put in Jan. 25 at midnight at the same time a permanent rate of the same amount was made for the Minneapolis Street Railway. A hearing had been set for Feb. 11, which was automatically rescinded. The St. Paul company had asked for an increased rate at the same time that the Minneapolis company did, but stipulated with the city that the rate that would be declared for Minneapolis would be satisfactory without a hearing. The order, carrying free transfer privilege as heretofore, includes South St. Paul.

O. P. B. Jacobson, chairman of the commission, intimated that failure of the Minneapolis city attorney to submit "land depreciation" testimony resulted in a higher rate for Minneapolis than might have been necessary. He said the rate fixed was adequate for St. Paul, but it might be too high for Minneapolis. He had refused to sign the Minneapolis order on the ground that decreases in land values had not been reckoned with in reaching the approximate evaluation of the Minneapolis Street Railway property. He also said that depreciation of land values in the last five years should have been one of the most important features of the testimony.

Meanwhile the Minneapolis City Council had voted to study the feasibility of municipal ownership.

Fare Advance Sought in Louisville

Railway there sees rate revision necessary if company is to be permitted to refinance and rebuild

THE Louisville Railway, Louisville, Ky., has petitioned Mayor Harrison and the General Council for a 10-cent cash railway fare. The cash rate was asked for, the company's letter to the Mayor said, "with the understanding that we will experiment with reduced-rate tickets."

Directors of the company also sent to the General Council a formal notice of its proposal to change the present 7-cent street car fare and 10-cent bus fare "to a rate of not more than 10 cents for either bus or street car fare, with half fare for school children going to and from school and with general transfers." The notice was accompanied by a proposed ordinance, which, if passed by the General Council, would put the increased rate into effect next April.

Case Stated in Company's Letter

In the two-page letter to Mayor Harrison, signed by James P. Barnes, president of the company, it was set out that the earnings on capital invested in the utility during 1928 were 3.2 per cent and estimated that the increase asked would give company stockholders interest and dividends amounting to 5.4 per cent of the rate base value. In its letter the company said:

For a number of years the net income of the Louisville Railway, while sufficient to meet bond interest, has not been enough to yield a fair return to investors in its property, nor even to assure satisfactory refunding of its maturing obligations.

During 1928 the number of passengers we carried in Louisville by cars and buses was 66,997,370. Our total income in Louisville was $4,855,144. We spent, in cost of operating 13,180,299 miles of service, in taxes ($461,000, which was 9.5 per cent of all earnings), in interest ($641,750) and in depreciation on railway property ($175,000), $4,600,056, leaving a total for stockholders from operation of city street cars and buses of $255,088.

The fair value of our property for rate-making purposes as of Dec. 31, 1928, including $339,000 spent for improvement and betterment of the property during 1928, is more than $28,000,000. Interest and dividends earned during 1928 were at the rate of 3.2 per cent on this value.

The public of Louisville desires more rather than less service. With these desires we are in sympathy. To increase our service would require additional expenditure for operation. We also desire to improve our service by substitution of thoroughly modern cars for some of those now in use. To do these things we must first make satisfactory arrangements to refund our $6,000,000 mortgage which becomes due June 30, 1930. At the same time, we must arrange for additional capital to be used in desirable improvements. To refund this capital on reasonable terms we must show net earnings at least equal to twice the interest on all monies borrowed. This will require annual earnings for interest and dividends of at least $1,500,000.

We ask a rate of fare not in excess of 10 cents, with the understanding that we will experiment with reduced rate tickets. We estimate that this advance will increase our net earnings by approximately $600,000, giving a net yield under 5.4 per cent of the rate base value. We are not insisting upon the full exercise of our right to an 8 per cent return.

In order to make the arrangement for necessary capital for refunding and improvements, we must have a positive history of earnings of sufficient duration so that fairly dependable forecasts can be based upon actual operation. In order to get this history of earnings in time for negotiation and for arrangement of financial details, it is of extreme importance that the adjustment affecting our earnings be accomplished practically at once.

Wage Case of Buffalo & Erie Reviewed by Court

In a decision rendered on Feb. 13 by the Court of Appeals, that body overturned a unanimous verdict of the Appellate Division, Fourth Department, as well as a decision of a special term of Supreme Court in Erie County, that would have authorized a board of arbitration to determine whether the Buffalo & Erie Railway should be allowed to reduce wages of its union employees by 10 per cent under a new contract. Although the Appellate Division was unanimous in its decision, it agreed to pass the case on to the highest court on the ground that a question of law was involved that should be reviewed by the Court of Appeals.

Judge Frederick E. Crane, who wrote the majority opinion after reviewing the circumstances leading up to the litigation, hinging upon an announcement of the company that a falling off in business necessitated a reduction in wages, continued:

Attention is immediately directed to the fact that no dispute has arisen between the parties to the contract over terms of provision of the contract, or any difficulty arising thereunder. The men have been paid the wages agreed upon and they have worked for and accepted those wages.

The railroad desires to make a new contract. It desires to reduce wages 10 per cent and seeks compulsory arbitration under the arbitration law for the purpose of arriving at new terms and agreements as to the rate of wages.

No power exists in the courts to make contracts for people. They must make their own contracts. The courts reach their limit of power when they enforce contracts parties have made.

A contract that requires the court to determine what an agreement shall be for the future is unenforcible, unless the lines of the agreement have been laid out by the parties.

Such is not the nature of the question that has been left open for decision here. The rate of wages to be fixed is not the fair or market value, the value measured by an objective standard, but such compromise values as may be chosen as a substitute.

The opinion goes on to point out that it is conceivable that the Legislature may enlarge the class of justiciable controversies, but that under the present law the negotiations involved do not fall within those now covered by law.

More Discussion of Underliers' Purchase in Philadelphia

Interest has been renewed in the plan for the city of Philadelphia to take over the underlying surface lines of the Philadelphia Rapid Transit Company, in consequence of legislative hearings now being held. It is the so-called Woodward bill which is now before the Legislature. That measure would permit the purchase of the underliers piecemeal instead of by the present plan of the Daix bill, which provides for all of them being taken over on the basis of the valuation of $139,000,000 fixed by the Public Service Commission for all of the properties.

Opponents of the Woodward bill feel that, as a measure toward unity of the transit lines, the Daix bill would be upheld as constitutional since it serves a broad general public purpose, but that the Woodward bill, contemplating only one purchase, would be declared illegal. It was on this basis that City Solicitor Ashton declared on Feb. 12 that, if the Woodward bill were passed, it would sound the death knell of the general condemnation proceeding. He said:

> The Public Service Commission has fixed a valuation in the underliers matter. Court proceedings are pending, awaiting the certification of the controller to a petition seeking judicial determination whether the bond issue will be chargeable to the borrowing capacity. Because of the attitude of the comptroller, we have not yet reached a decision as to our course, which might call for mandamus proceedings.
>
> In any event, I believe it is still possible to get the underliers' proposal before the people this spring. I don't believe there will be any extraordinary delays. Even if there is an appeal taken, the public interests are so considerable I feel we could get an instant hearing.

The Daix measure was intended to substitute the city as the new owner and leesor of the underlying lines for the present owners, who lease the roads to the Philadelphia Rapid Transit Company for operation on a fixed rental basis.

Traffic Problem Before U. S. Chamber

Study which it proposed expected to be great aid in applying regulatory policy

AS THE District of Columbia Public Utilities Commission is proceeding toward the enactment of definite regulation of street car speeds in Washington, the United States Chamber of Commerce has decided to make a study of the traffic problem in its entirety by embarking on a study of the transportation situation in the various cities. Concerning the matter of speed limits for street cars, traffic experts were surprised to find that the model traffic ordinance, approved by the National Chamber of Commerce, made no mention of street cars in connection with the speed of operation.

Although the speed question will not be taken up directly in this city transportation survey, it is expected that some of the fundamental factors relating to metropolitan traffic conditions will be considered for the first time to any extent. In this connection it is pointed out that, while the relative services performed by the different types of vehicles have been discussed, not much has been done toward the establishment of facts. When more is known as to the relative value of the various forms of transportation agencies, it is felt that the authorities will then be in a position to fit each vehicle into its proper place in the transportation scheme.

Those in charge of the work realize that in many cities the special function performed by the street cars and the buses is tacitly acknowledged. When more information is available, however, it is felt that in place of various types of understandings as to what features of existing codes shall be excepted from application to street cars and buses, it will be possible to adopt a separate series of rules for these vehicles. As the Chamber of Commerce always has championed the doctrine of allowing the business and industrial organizations to solve their problems with as little regulation as possible, it is believed that this traffic study will be a great aid in applying this policy to the traffic question. If some of the basic factors can be isolated and the facts established, it is believed that business and commercial interests will lose little time in seeing that some of the existing traffic abuses are corrected, irrespective of the formulation of new codes by governmental bodies.

Antiquated Cars of Key System Burned

TWENTY-ONE street cars of the Key System Transit Company, Oakland, Cal., representing an original investment of more than $250,000, recently declared unfit for service by President A. J. Lundberg, have been burned on the Key System pier fill on the Oakland estuary.

The funeral pyre of the old street cars was touched off by Joseph Gilman, veteran carpenter and shop employee of the Key System, who had built ten of the 21 cars destroyed. Of the 21 cars burned, ten were known as the Kelly type and were recently withdrawn from service when the Alameda-San Jose Avenue No. 9 line was discontinued. These cars, named after W. F. Kelly, who was general manager of the Oakland Traction Company in 1903, at the time they were built, created much comment for their novel construction. Their center entrances on the sides of the cars brought street railway experts from all parts of the country to view them. Newer equipment will replace the cars destroyed.

Subsidy Suggested in Twin Cities

Attention of the City Council has been officially directed to the subsidy plan for putting car fares back on the old nickel basis. The Council is asked to study this plan, which calls for the payment out of the city treasury of any deficit in the company's earnings from the standard 7½ per cent return on the investment.

There is something to be said for this plan, but there are objections to it that would probably cause it to be vetoed. Minneapolis could not do business without its railway. Real estate values and rentals are dependent upon it. One difficulty is that a subsidy taken out of tax income would rest not only on those who do not use the cars, but also on those who do. No practicable way has yet been devised, we believe, of taxing the non-user for his share and letting the user go free.

Another vital objection is that a subsidy would be an invitation to the company to let its service bog down into inadequacy, because its incentive to stimulate patronage by all possible means would be gone.

There is the further consideration that taxes are already too high in Minneapolis, and that the city is not in financial condition to take on an extra burden such as this might prove to be. Still there's no harm in a study of an interesting proposal.—*Minneapolis Journal.*

State Body Wants New York Lines Unified

Unification of all subways, surface lines and buses in one gigantic system under municipal ownership was proposed for New York City on Feb. 7, at a meeting of the Chamber of Commerce of the State of New York. The resolution, offered by Jacob H. Haffner, chairman of the committee on public service for the metropolitan district, was passed without a dissenting vote.

Under this plan the city would purchase all the rights and property now

owned by the Interborough Rapid Transit Company and the Brooklyn-Manhattan Transit Company. The independent railways and bus companies, too, would be bought up.

Some of the surface lines would be scrapped, and others would be replaced by buses.

The resolution says:

The Chamber has advocated complete municipal ownership of all transit lines because the city already is committed to this principle through its ownership of the subways; but the Chamber has repeatedly opposed any plan that contemplates municipal operation of our transit lines.

The resolution of the Chamber's committee was presented at a regular meeting of the state body. In presenting the resolution Mr. Haffner said:

During the Hylan administration the new municipal subway was begun, which was intended to compete with the system then, as now, owned by the city. It was known in transit circles as a "spite" system. C. E. Smith, a transit expert, who made a complete study of the transit situation, in his report advocated the unification of subways, street cars and buses. Controller Berry has made similar recommendations.

Springfield Work Commended

In his midterm message to the City Council of Springfield, Mass., Mayor Parker referred to the accomplishments of the Springfield Street Railway and to some of its needs for 1929. A sum approximating $500,000 had been spent for new cars, equipment, motor coaches and improvements in line with the New York, New Haven & Hartford Railroad's program based on a gentleman's agreement with the city for such rehabilitation. During 1927 and 1928 the Springfield company had expended approximately $1,800,000 for equipment, extensions and general rebuilding work. Citing Clark V. Wood, president of the Springfield Street Railway, he remarked that he had steadfastly kept every promise made to the city. He said that Springfield was fortunate and should feel grateful for all the costly improvements.

St. Louis Merchants Want Parking Restricted

A bill to prohibit all parking on Grand Boulevard between Laclede Avenue and Page Boulevard was presented to the Board of Aldermen, St. Louis, Mo., on Feb. 1 by Alderman Thomas Watts of the seventeenth ward. At present one-hour parking is permitted in this stretch except during the rush hours. A similar bill was repealed two years ago after merchants along Grand Boulevard protested the measure deprived them of business. The same merchants are now seeking relief from the traffic congestion caused by the parking of automobiles. Parking by patrons of theatres and by visitors to office buildings in this district prevent patrons in automobiles from reaching the stores.

Pick-Up Rides Hurt Massachusetts Lines

Representatives of electric railways and bus lines have been recorded in favor of a bill, pending before the legislative committee on street railways in Massachusetts, which would prohibit private automobile owners from operating their machines for hire over routes on which vehicles duly licensed by the state are now run. The bill is aimed chiefly at car owners who transport fellow workers to places of employment for nominal fees and taxi cab owners who carry on a regular business between municipalities.

Henry C. Attwill, chairman of the Public Utilities Department, has offered the opinion that the bill will not remedy existing conditions. He suggests an amendment to the present vehicle laws if anything is to be done. Day Baker, representing the Motor Coach & Bus Association of New England, says unfair competition of the kind the bill is intended to correct exists throughout the state. He referred to the absence of insurance against accidents where private owners transport passengers. The competition is doing much, he says, to injure the bus lines, which maintain expensive equipment and carry heavy insurance under the state law. H. Ware Barrum, of the Boston Elevated Railway, has asked that the bill be amended to make such competition against electric railways illegal.

More Facts Disclosed in Cleveland Plans

Negotiations between the Cleveland Railway, Cleveland, Ohio, and the street railway committee of the City Council, in regard to a two-zone fare system, have developed the fact that the zone plan is part of the proposed rapid transit development being worked out by the Cleveland Railway and the Van Sweringen interests. Joseph H. Alexander, railway president, told the committee that it was his idea that the boundary of the inner zone would coincide with the point between which the central terminal rapid transit trains would operate on limited schedules.

The committee accused the company of attempting to force approval of one phase of rapid transit without the entire picture being disclosed. Mr. Alexander replied that the complete proposal would be submitted to the Council as soon as legal and engineering details are worked out and before the Council is asked to take any final action on a zone system.

Various zone plans in effect in American cities have been explained to the committee by H. M. Brinkerhoff, of the engineering firm of Parsons, Klapp, Brinkerhoff & Douglas, which was retained by the Cleveland Railway more than a year ago to make rapid transit studies.

In connection with the proposed financial set-up of the rapid transit and surface car merger, it has been disclosed that control of the Cleveland Railway is in the hands of three Cleveland banks. The largest individual stockholder is reputed to be Cyrus S. Eaton, utility operator.

New Exchange Ticket Arrangement in Philadelphia

Three-cent exchange tickets will be issued at City Hall station of the Broad Street subway in Philadelphia to surface lines operating east and west in the central district. The Philadelphia Rapid Transit Company has agreed to plan for a trial period commencing March 1.

Regulatory Measure Introduced in Texas

A comprehensive attempt to bring regulation of all public utilities under one central body is contained in a joint resolution introduced in the Texas House. It calls for a constitutional amendment to change the name of the Railroad Commission to the Railroad and Public Utilies Commission and provide a membership of five instead of three, as the Railroad Commission is now constituted. Within its permit giving and rate making jurisdiction would come not only the railroads of the state, but such large state utilities as the hydro-electric power companies and companies operating transmission lines, gas distributing and pipe line companies, oil pipe lines, bus and truck lines. Telephone and telegraph lines also would come under its jurisdiction. A bill with a similar purpose has been prepared for introduction in the Senate. This measure would obviate the necessity of a constitutional amendment by simply increasing the powers of the presently constituted Railroad Commission.

Unification Bill Introduced in New York

After long delay the Board of Transit control bill, sponsored by the New York City administration as a vehicle for the unification of transit facilities within the city, was introduced in the Legislature on Feb. 14.

The bill is the draft perfected by Samuel Untermyer, special counsel for the State Transit Commission, after public hearings relating to the transit situation within the city. It contained none of the changes expected after the Mayor's recent visit to the Capitol.

The Republican leaders of the Legislature fear that if it should prove impossible for the Legislature to act on the city legislation, owing to the city's tardiness in producing the bills, they may be blamed this year as they were last year for the failure to pass the legislation demanded by the city.

The bill is an amendment to the transit commission law and is permissive, so that the city can effect unification under its provisions or without applying the proposed new law, as it sees fit.

Further Studies by Taxation Committee

Organized efforts to lighten the burden of taxation on the electric railway industry were begun at a meeting of the committee on taxation held at association headquarters on Jan. 18. It was brought out in the discussion at this meeting that the problem has a national aspect as well as a local aspect in every community where electric railways operate. Successful efforts have been made in some localities to lighten the burden. As a preliminary step in the committee's activities it was decided to study the nature of these efforts and the results attained. After this has been done the committee will be in a position to recommend methods by which the industry may hope to obtain some measure of relief from its present burden of taxation.

The members present at this meeting were: H. L. Geisse, chairman, G. G. Brownell, John L. Swope, Edmund W. Wakelee, W. J. Flickinger, L. D. Pellissier, J. P. Ingle, Charles Wygand (representing L. J. DeLamarter), Arthur W. Brady, H. B. Cobban, F. W. Doolittle and Leslie Vickers.

Oklahoma Utilities Will Discuss Finance and Operation

Two of the outstanding features of the eleventh annual convention of the Oklahoma Utilities Association, to be held at Oklahoma City on March 12-14 inclusive, will be addresses by two national leaders in public utility operations. Martin J. Insull, president Middle West Utilities Company, Chicago, Ill., will speak on "Financing Public Utilities." Halford Erickson, vice-president in charge of operation Byllesby Engineering and Management Corporation, Chicago, Ill., will talk on "Facts Relating to Group Operation of Public Utilities." Great interest in the convention is being shown by public utility people throughout the state, and by manufacturers and suppliers of electrical, gas and telephone equipment. All available exhibit rooms have been engaged.

Skip-Stop Revival Suggested in Newport News

City Manager J. C. Biggins of Newport News has suggested to Council a drastic change in the present traffic system on the main thoroughfare, including the appointment of four more traffic officers and the revival of the "skip-stop" system used during the war. The officials of the Virginia Public Service Company have agreed to co-operate and have their cars stop only at the even-numbered intersections. The survey which the city manager presented showed that during the first nine months of 1928 there were 308 traffic accidents, 55 of which resulted in personal injuries, which kept the victims under medical care for periods ranging from several days to several weeks. The plan now fostered would have traffic officers on duty at designated streets from 11 a.m. until 8 p.m., and until 9:30 p.m., on Saturday.

Wage Renewal on Georgia Power

The renewal of the annual wage and working agreements between the managements of the Georgia Power Company, the South Carolina Power Company and representatives of the union employees in Augusta and Aiken was effected recently. Although similar to the old one, the new arrangement carried two specific provisions different from the old ones. First, the companies grant a flat increase of 2½ cents an hour to all street car operators, making the new rate 55 cents an hour, and, second, the basic work day provides for eight hours with the usual allowance for overtime pay according to the respective "runs" of the car schedules. Heretofore, the basic work day was nine hours. The new contract was effective Jan. 1.

The company has granted a 3-cent an hour increase to street railway employees of Rome, Ga. This contract will run for two years.

COMING MEETINGS OF *Electric Railway and Allied Associations*

March 1—Metropolitan Section, American Electric Railway Association, 33 W. 39th St., New York, N. Y.

March 12-14—Oklahoma Utilities Association, annual meeting, Oklahoma City, Okla.

May 1-3—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.

May 13-15—National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.

May 15—Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.

June 5-7—Canadian Electric Railway Association, annual convention, Montreal, Quebec.

June 21-22—New York Electric Railway Association, Bluff Point, N. Y.

June 27-28—Central Electric Railway Association, Michigan City, Ind.

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Sept. 28-Oct. 4—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.

Ten Cents in Kansas City

Application for a straight 10-cent fare with universal transfer has been made by the Kansas City Public Service Company, Kansas City, Mo. The application has gone to the Missouri Public Service Commission in the form of a new schedule of rates which sets up a one-fare area over Greater Kansas City, and applies a straight 10-cent fare to all street cars and feeder buses, with common transfers. March 14 is named as the effective date.

Present street car tickets, now sold fifteen for a dollar, and street car tokens now two for 15 cents would disappear. The trunk line bus tokens, two for 25 cents would remain. The trunk line buses have a chance to survive, at least where there is a better showing in earnings. A hearing on the merit of the higher fare will probably be ordered.

No Higher Fares Expected in Columbus

No raise in the 6-cent fare is being considered, according to a statement by C. C. Slater, president and general manager of the Columbus Railway, Power & Light Company, Columbus, Ohio. It had been charged that the decrease in light and power rates, which took effect recently, was a "feeler," so that at some future date an increase in car fares could be sought. Councilman Zimpfer, chairman of the Council Utilities Committee, denying any connection, said a higher car fare would have to be approved by the Council and voters.

It is said the Council favors running the two divisions separately, making up a deficiency in any one by raising the rates of that one.

Taxi Development Being Watched in Cincinnati

The Cincinnati Street Railway, Cincinnati, Ohio, will proceed conservatively but decisively in determining what form the future public transportation shall assume. It will proceed only in the best interests of the people as it did in operating buses as soon as their use by the company was legalized. President Draper is reported to have said:

Many people doubtless prefer an exclusive service if it can be provided at reasonable rate of fare. If the taxicab service should be developed to the point that it would make inroads into the business now done by the street cars, it might be necessary to develop a taxicab service as a branch of the system, so that the efficiency of the street car, bus or other essential urban transportation can be maintained. The situation is being carefully watched in Cincinnati and in the other cities in which taxicab service has been taken over by the mass transportation companies.

Revenue of the Cincinnati Street Railway in 1928 was larger by about $119,000 than in the preceding year, due to a greater number of passengers being carried on both coaches and cars, although the average fare was slightly

less than in 1927. The decrease in average fare resulted from an increased use of the Sunday pass, which is sold for 25 cents and entitles the holder to as many rides as he wishes on the day for which it is issued.

There has come up for consideration of the city and the company the extension of service to several new districts and these will be dealt with and provided as soon as the district justifies the move. Mr. Draper mentioned extension of the Warsaw line to Western Hills High School; the district near the intersection of Baltimore Pike and McHenry Road which has been provided with bus service to connect with the Westwood line on Harrison Avenue, and Bond Hill, to which bus service has been provided. Fernbank and Sayler Park, he said, have asked for through service to the city. The district is now served by the Cincinnati, Lawrenceburg & Aurora Railroad. Taking over this service would result disastrously for the railroad, he said, and a plan is now being considered which will give satisfactory service and still enable the interurban line to operate. Several other districts are being considered as fields for the extension of service.

More Safety Records on Penn-Ohio System

Cars and buses were run for three months with only three accidents charged against them by New Castle operators of the Penn-Ohio, who won the fourth and final accident prevention contest of 1928 on the system and the system's safety trophy.

In this period the New Castle men operated 353,045 miles, an average of 117,683 miles to the accident. Final reports for the year come within a few days of the announcement of the award to the Penn-Ohio system as a whole of the highest national safety honor, the Brady Medal.

In the twelve-month contest just closed, the New Castle operators were pitted against those of the Sharon division and the Trumbull division in a triangular race. Each of the divisions had fewer accidents in 1928 than in 1927 when their record won them the Brady Medal. The same thing was true of the Youngstown car and bus divisions and the interurban coach divisions which were not competing in the contest won by New Castle.

Resumption on Branch of Southern Ohio Public Service

The Lima-Toledo Railroad, the Toledo connection of the Southern Ohio Public Service Company, which operated an electric railway between Columbus and Zanesville, until Jan. 15, plans to resume operations to the points formerly served by the Southern Ohio Public Service Company about Feb. 15, by use of rail to Columbus and motor truck beyond. This route will serve about 60 communities in the Newark-Zanesville territory.

Recent Bus Developments

Would Furnish New Service in Buffalo

Bernard J. Yungbluth, president of the International Railway, Buffalo, N. Y., has submitted a proposal to the City Council for the establishment of bus service between the downtown business district of the city and the new passenger terminal of the New York Central Railroad in Curtiss Street, which will be opened in April. The new terminal is 3 miles from the present New York Central Station and is 2,000 ft. from the nearest car line.

Mr. Yungbluth says it is desirable that the Broadway car line be connected with the new terminal through the construction of a loop from Broadway to Curtiss Street to the station. He says provision for such service was made in the design of the terminal and the area to be occupied by the proposed tracks is not being used for street purposes.

Under the city charter, however, no franchise for street railway extensions can be granted without a referendum by the voters. Because of the short time intervening before the opening of the station in April, Mr. Yungbluth says it would be impossible to hold a referendum and construct the tracks so he proposes the establishment of a bus service until such time as the referendum can be held. He asks immediate action on the bus line proposal.

Newly Developed Districts in Birmingham Demand Transit

Petitions are being circulated all over Birmingham, Ala., requesting the City Commission to pass an ordinance authorizing the operation of buses or jitneys throughout the city. It states that the service furnished by the Birmingham Electric Company is inadequate, and that many sections of the city are not reached by the cars. During the past few years many new suburbs have grown up in the Birmingham district and these are not reached by street cars or public transportation of any kind. Due to this fact many property owners of these suburbs say that the land is not worth so much as it should be, because it cannot be reached by public conveyance.

A few years ago many buses and jitneys of various kinds were operated in all sections of the city, but later they were voted out by the people at a special election called to secure an expression of popular opinion.

In the event new petitions are signed by the number of people required under the law, an election will be called by the City Commission and the people will be afforded a chance at the polls to say whether or not they desire the buses and the jitneys to be operated within the city again. One argument used against the buses and the jitneys, in the campaign preceding the last election on the question, was that these buses and jitneys congested traffic too greatly in the business section of the city.

Extended Service in Jamestown

Extension of the facilities of the Jamestown Motor Bus Transportation Company, subsidiary of the Jamestown Street Railway, Jamestown, N. Y., was recently effected with the establishment of a line between Jamestown and Greenhurst, a one-way distance of 5 miles. The fare charged between the two points is 20 cents and an hourly service is maintained in each direction during the day and early evening hours.

Wild-Cat Operation at Camden Hurtful

As a result of wild-cat competition at Camden, N. J., there has been unnecessary duplication of service and great waste in certain sections of the territory, while other sections have suffered from lack of service. The operating companies have met with large losses since it has been impossible to work out any comprehensive plan designed to provide a co-ordinated system of transport such as the community in and around Camden requires.

In the correction of this situation the officers of the Public Service Co-ordinated Transport have been badly hampered by the failure of Congress to provide for the regulation of interstate traffic. While such regulation may be provided at this session of Congress, the company proposes irrespective of whether this is done to take such steps as are possible to remedy the existing conditions. These conditions as set forth by M. R. Boylan, vice-president in charge of operation, follow:

1. That practically all transportation lines operate in one or more municipalities and many of them in two states.
2. That so far as interstate operation is concerned it is without effective regulation.
3. That responsibility for both the character and extent of the service is divided among a number of operators, no one of whom is in a position to control the situation.

It is the opinion of the officers of the Public Service Co-ordinated Transport that transit in New Jersey can best be handled by a New Jersey organization, and with that end in view they have been conducting negotiations with the Philadelphia Rapid Transit Company for the control of the Penn-Jersey operations. They believe that transportation facilities will be of greater service to the public when more efficiently operated, and they are for that reason combining independent operations with those of Public Service wherever this

is possible. They believe that the waste that invariably follows unregulated competition is an economic crime against the users of the service, and that the public can be depended upon to discourage it.

The company has pledged itself, so far as its own organization is concerned, to make every effort to straighten out the present difficulties so that it will be in a position to meet the requirements of the community in and around Camden in full.

Additional Rights Sought in Albany

There was a hearing on Jan. 14 before Public Service Commissioner Lunn on the petition of the Albany Transit Company, Albany, N. Y., for a certificate for the operation of additional bus routes in the city of Albany, serving the New Scotland Avenue and Westland Hills section.

Several witnesses called by Andrew V. Clement, attorney for the Westland Hills Improvement Association, opposed the granting of the certificate covering a line by the company in that section of the city.

R. B. Hayes, president of the Albany Transit Company, stated that if the certificate is granted, twenty buses will be put into operation, eighteen buses of 29-passenger capacity and two of 40-passenger capacity, and that transfer points for transferring to existing lines would be established in different sections of the city.

N. F. Towner represented the Albany Transit Company and John E. McLean, the United Traction Company. There will be another hearing before Commissioner Lunn on Jan. 28. The Capitol District Transportation Company is the subsidiary of the United Traction, while the lines of the Albany Transit Company are operated independently.

To Expand Sacramento Northern Service

Application has been made by the Sacramento Northern Railway to the California Railroad Commission for a certificate of public convenience and necessity to operate auto passenger, baggage and express service between Marysville and Chico and all intermediate points; also between Marysville and Colusa and all intermediate points.

Experiments in San Leandro Proved Too Costly

Permission has been granted by the California Railroad Commission to A. J. Lundberg and other officials of the Key System Transit Company, to abandon operation of an experimental motor coach line in San Leandro, Alameda County, which has been in service for a six months' trial. It was found that the revenues of the line did not warrant its continuance.

Expansions Seen in Lexington Deal

J. P. Pope, vice-president and general manager, Kentucky Traction & Terminal Company, Lexington, Ky., has announced the completion of a deal whereby the Kentucky Security Corporation, Philadelphia, which controls the Kentucky Traction & Terminal Company, plans to take over the Consolidated Coach Corporation, with headquarters in Lexington, and operate a large net work of bus lines over the state and into several adjoining states.

Mr. Pope stated that an investigation of the bus company operations had been underway for several weeks. Nothing has been divulged regarding plans of the buyers for the bus line after the transfer.

The Consolidated Coach is capitalized at 6,300 shares of $100 par value common, which, it is understood, is to be purchased at par.

Agreement on Southbridge Fares

An agreement has been reached with officials of Southbridge, Mass., and the Worcester Consolidated Street Railway to the effect that round trip tickets on buses between that town and Worcester will be $1.25 with 75 cents as single fares. These rates will go into effect as soon as they are approved by the State Department of Public Utilities.

Assembly Flooded With Railway and Bus Bills

Legislative proposals, ranging from bills which would remove municipally-owned utilities from jurisdiction of the public service commission to measures designed to regulate the width and length of buses and to place taxicabs under utility commission control, are included in the vast flood of regulatory suggestions put before the 1929 Indiana General Assembly. Matters concerning public utility regulation have held a prominent place on the docket ever since the two houses convened at Indianapolis in January.

A renewed effort to amend the present public service commission law so as to incorporate in it different methods of determining utility valuations for rate-making purposes and issuance of securities is involved in House Bill No. 230. This bill, known as the Kistler-Knepper bill, would make the original or "actual" cost of public utility properties the basis of fixing valuations instead of the present "true value" or reproduction cost new theory generally insisted upon by the utility companies. It would also prohibit utilities from manufacturing and selling appliances designed to consume the service supplied.

A minority report of the cities and towns committee favoring indefinite postponement of consideration of House Bill 16, which would remove city-owned utilities from the jurisdiction of the public service commission and establish methods for municipalities to build or acquire public utilities either co-operatively or independently, was rejected by the House early this month and finally killed.

Buses Supplant Cars on Rock Island Line

The Tri-City Railway has secured consent from the Council of Rock Island, Ill., to abandon its track south of 21st Avenue on Eleventh Street, to Watch Tower Park, a distance of nearly 30 blocks, and its Milan line, extending a mile farther. Buses, operating on a fifteen-minute schedule, with a 15-cent fare, will be substituted.

Bus Lines Essential in San Francisco but Operate at Loss

M. M. O'Shaughnessy, city engineer of San Francisco, Cal., has submitted a report to the public utilities committee of the Board of Supervisors, showing that in the first ten months of 1928 every bus line operated by the Municipal Railway was a financial liability to the city. A deficit of $97,176 was piled up, with the Marina bus line leading all others in financial losses. The engineer recommends that the Marina line be discontinued at once, stating that a saving of $9,000 yearly will be made by such action.

The discontinuance of the Marina bus service was recommended some months ago by Fred Boeken, superintendent of the Municipal Railway, and the Board of Public Works agreed. Later the Board of Supervisors authorized continuation of the line when residents of the district protested. Although other bus lines are operating at a loss, Mr. O'Shaughnessy points out that they are serving approximately 3,000,000 passengers a year and therefore must be considered as a valuable part of the municipally-owned transportation system. The deficit incurred by operation of the Embarcadero bus line will be covered by a subsidy granted to the city by the State Board of Harbor Commissioners, the report states.

Putting Teeth into Bus Law in Minnesota

A bill has been introduced in the Legislature which proposes to authorize the Minnesota Railroad & Warehouse Commission to employ a maximum of three inspectors, with powers to arrest and take into custody violators of the bus act of 1925, largely persons operating bus or truck lines without permits. Such offenses will constitute a misdemeanor in addition to the present fine of $50 a day for each day's operation without permit. In the past the courts have been hesitant about assessing this fine. This bill meets the objection that the bus law has no teeth.

Financial *and* Corporate

Detroit Revenue Report

Private auditing firm finds net revenue $1,265,180 less than amount actually required

PRICE, WATERHOUSE & COMPANY have released their annual report covering the affairs of the Department of Street Railways, operating the municipal railway system at Detroit, Mich. The findings indicate that the net revenue derived from operation of the municipal lines during the last fiscal year was $1,265,180 less than was actually required. There is, however, the usual variation in the figures presented by the independent auditing firm and the auditors of the railway, due to the fact that each proceeds in a separate manner in arriving at the amount which should be listed as fixed charges.

After quoting from the city charter provision calling for a fare adequate to meet operating expenses of the system, taxes on the physical property, fixed charges, and sinking fund requirements sufficient to pay the principal of the issued mortgage bonds at their maturity, the Price, Waterhouse report says:

TERM "FIXED CHARGES" NOT SPECIFIC

In this connection we have previously stated that it is to be regretted a more specific statement as to what was intended to be contained in the expression "fixed charges" was not set forth in the charter, especially with regard to the element of depreciation as, from an accounting standpoint, depreciation is generally considered a fixed charge, so that from such standpoint the city charter requires the rate of fare to be sufficient to cover both the elements of debt retirement and depreciation.

Accepting that basis and also accepting the depreciation provisions made in the attached accounts, the net income for the year under review was insufficient to the extent of $1,265,180 plus the indeterminable amount properly chargeable to operations. Further, $407,367 expended on certain construction and replacement jobs during the year was wholly charged to capital charges by the department, while it is intimated some should have been charged to operation.

Railway passenger revenue fell off $1,063,782, bus passenger revenue increased $289,793.

The sinking fund requirements for the year, amounting to $2,600,377, exceeded the $1,335,047 net income after depreciation by $1,265,180, as compared with a deficiency of $687,329 for the year ended June 30, 1927.

On account of the fact that the accounts have been kept on the same basis as in former years we would point out, as we have in previous reports, that the figures above stated are properly subject to adjustment due to the fact that certain items have been charged in the accounts of the department as capital expenditures which, in our opinion and in accordance with the accounting regulations promulgated by the interstate commerce commission, should at least in part be charged to operating expenses. These items are expenditures for:

1. Reconstruction of lines resulting in a partial addition or betterment of the property.
2. Shifting the location of lines resulting only in a partial betterment.
3. Replacement of abandoned property, no adjustment of the property account having been made in respect of the abandonments.

Expenditures of this character made during the year under review, all of which have been capitalized, amounted to $407,367 as compared with $879,455 during the preceding year. On account of the lack of basic data we are unable to state how much of the above expenditures should be charged against income as being in the nature of replacements as distinguished from additions and betterments.

Mayor Lodge, seeking to reconcile the department's figures with those presented by the private auditing firm, has ordered John H. Morgan, new auditor for the system, to prepare a report reconciling the two audits.

Consolidation in Brooklyn

Surface lines of Brooklyn-Manhattan Transit Corporation and routes of Brooklyn City Railroad to be merged. Personnel of new company not yet determined

W. S. MENDEN, president Brooklyn-Manhattan Transit Corporation, and H. Hobart Porter, president Brooklyn City Railroad, announce that the boards of directors of the two companies at special meetings held on Feb. 13, authorized an agreement for the consolidation of the street surface railroads of the B.-M.T. system and the Brooklyn City Railroad. The consolidation will require approval of the Transit Commission and favorable action by the stockholders.

The consolidated company will have a capitalization consisting of 283,250 shares of preferred stock, 820,000 shares of common stock, and the funded debt of the existing companies outstanding in the hands of the public, aggregating approximately $31,105,528. Both the preferred stock and the common stock are to be shares without nominal or par value. The preferred stock is to be entitled to cumulative dividends at the rate of $4 per share for the first year, $5 for the second year and $6 thereafter. It is to be redeemable at $110 per share and accrued dividends, and is to be entitled on voluntary liquidation to $110 per share and accrued dividends before any distribution on the common stock.

This capitalization of the consolidated company compares with the existing combined capitalization and indebtedness of the companies to be consolidated, aggregating approximately $36,000,000 par value of capital stocks and $58,000,000 principal amount of indebtedness. Existing indebtedness of more than $27,600,000 is to be cancelled or turned in to the treasury of the consolidated company.

The holders of the outstanding $10 par value stock of the Brooklyn City Railroad, aggregating $16,000,000, are to receive in exchange for their stock 160,000 shares of the preferred stock and 400,000 shares of the common stock of the consolidated company, which is at the rate of one share of the preferred stock and 2½ shares of common stock for each ten shares of the outstanding stock. The B.-M.T. is to receive 123,250 shares of the preferred stock and 400,000 shares of the common stock of the consolidated company in exchange for or cancellation of approximately $20,000,000 par value of stocks and $27,000,000 principal amount of debts of the B.-M.T. surface companies, and in settlement and cancellation of the $13,000,000 construction account claim of the B.-M.T. against the Brooklyn City Railroad, now in litigation.

The surface railroads of the B.-M.T. system and the Brooklyn City Railroad between them operate practically all the surface railroads in the Borough of Brooklyn and a substantial part of the surface railroads in the Borough of Queens. The two systems embrace approximately 500 miles of single track and for the fiscal year 1928 carried more than 500,000,000 passengers. Consolidation of these properties under one company will simplify the relations with the public authorities, and enable the consolidated company to deal more directly and authoritatively with the city in connection with plans for the readjustment and improvement of transit.

The name of the consolidated company and the personnel of its directors and officers have not been determined, but its directorate will be representative of the Boroughs of Brooklyn and Queens. It is expected that the consolidated company with its simplified organization and improved financial structure, due to the large reduction of existing debt, will be able with the cooperation of the public authorities to furnish improved service.

Under the agreement 20,000 shares of the common stock are to be reserved in the treasury of the consolidated company. This is the maximum number of shares that may be issued by the consolidated company in connection with the existing agreement between the B.-M.T. and the Equitable Coach Company. This maximum number is subject to reduction as provided in such agreement and the issue of any part thereof is conditional upon the Equitable Company now seeking approval of bus rights granted to it, obtaining the terminable permit and the Transit Commission's approval as required by such agreement, and upon the consummation of the consolidation.

Three-Cent Line to Continue Another Thirty Days

The Van Brunt Street & Erie Basin Railroad, operating a line a little more than a mile in length in the Erie Basin district of Brooklyn and charging a 3-cent fare, has been ordered to continue operation for 30 days by State Transit Commissioner Fullen. It had been proposed to discontinue the line at once, Edward Kelly, the receiver, having informed the transit commissioner that the road was being operated at a loss. Commissioner Fullen, however, ordered the service continued so that some arrangements to provide a substitute bus service or some other method of transportation could be made.

Ottawa Earnings Insufficient

In its fifteenth annual report for the year ended Dec. 31, 1928, T. Ahearn, president of the Ottawa Traction Company, Ltd., states that earnings of the Ottawa Electric Railway, Ottawa, Ont., for the year did not warrant the payment of dividends; consequently, no dividend was received from the Ottawa Electric Railway and no dividend was paid by the Ottawa Traction Company during the year. Some track was rehabilitated and the plant and equipment maintained in an efficient condition.

I.C.C.—No Jurisdiction on Security Issuance

Effort of minority stockholders of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., to obtain a ruling from the Interstate Commerce Commission on its jurisdiction over the issuance of securities of that railroad were defeated recently when the commission dismissed their petition on the ground that it had no authority to enter an order on the question presented. The petition, which was filed more than a year ago by representatives of a protective committee of security holders, charged that the North Shore Line since 1920 had issued various stocks and bonds without seeking the commission's approval. The company's defense was that, as an electric interurban line, it should not be classified as a common carrier and was, therefore, exempt from the security provisions of the transportation act of 1920.

The commission dimissed the petition on the ground that the complaint asked no positive relief but merely sought an expression of opinion as to whether a provision of the act had been violated. Under the law, the commission declared, it had to act on petitions of carriers for authority to issue securities, and had no authority to award damages sustained by holders of void securities or to punish the carrier issuing them.

At the present time the interstate rates and service of the North Shore Line are within the jurisdiction of the Interstate Commerce Commission, but securities and intrastate rates and service are subject to regulation by the Illinois Commerce Commission and the Wisconsin Public Utilities Commission.

Traffic Fares and Wage Figures

The total number of revenue passengers reported by 234 companies to the American Electric Railway Association for the month of December, 1928, compared with December, 1927, is as follows:

December, 1928	968,006,459
December, 1927	1,006,730,944
Decrease	3.85 per cent

This decrease in December was due to a combination of factors believed to be only temporary in their effect and it is expected that January and later months will see normal conditions restored.

There was one extra Sunday in the month of December, 1928, compared with December, 1927. The two holidays, Christmas and New Year's, fell on Tuesday and very many places of business closed down the Friday before Christmas and did not reopen until the following Wednesday and the same thing was done before the New Year's week-end. Another factor, the prevalence of a mild epidemic of influenza, kept a considerable number of people away from their ordinary occupations. Finally, the mild weather conditions prevailing throughout the month encouraged automobile owners to use their cars freely and to keep them out of winter storage longer than they ordinarily would.

Average cash fare in cents in cities of 25,000 population is:

Dec. 31, 1928	8.2981
Nov. 30, 1928	8.2553
Dec. 31, 1927	8.1113

The rise in the average is due to fare increases occurring during the month of December in the following cities: Baltimore, Md., from 9 cents cash with three tokens for 25 cents to 10 cents cash with four tokens for 35 cents; Bloomington, Ill., from 7 cents cash with four tokens for 25 cents to 10 cents cash with three tokens for 25 cents; Danville, Ill., from 7 cents cash with five tokens for 30 cents to 10 cents cash with three tokens for 25 cents, and Decatur, Ill., from 6 cents cash with nine tokens for 50 cents to 10 cents cash with three tokens for 25 cents.

The above changes produced four additional 10-cent cities, bringing the total number of 10-cent cities up to 248, of which 130 have a population of 25,000 or more.

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:—

	Average Hourly Rate, Cents	Index Number 1913=100 Per Cent
Dec. 31, 1928	57.52	211.08
Nov. 30, 1928	57.52	211.08
Dec. 31, 1927	57.29	210.24

Financing by New Jersey Corporation Authorized

The State Board of Public Utility Commissioners, of New Jersey, on Feb. 8 approved the application of the Public Service Co-ordinated Transport, Newark, for issuance of 125,000 shares of no par common stock. The company also was authorized to issue ten notes of a face value of $650,000 to reimburse its treasury for expenditures for new equipment. The stock issue is to reimburse the treasury for extensions to its plant.

Net in Buffalo $733,744

The accompanying table gives the results of operation by the International Railway, Buffalo, N. Y., in 1928 compared with 1927.

CONSOLIDATED INCOME ACCOUNT OF THE INTERNATIONAL RAILWAY YEAR ENDED DEC. 31

	1928	1927
Operating revenue	$11,116,652	$11,192,907
Operation and taxes	9,086,822	9,733,796
Operating income	$2,029,829	$1,459,110
Non-operating	56,912	50,138
	$2,086,742	$1,509,249
Fixed charges	1,352,998	1,440,340
Net income	$733,744	$68,908

Note—The net income for 1927 is after deducting $340,171 for amortization of intangible capital. No such deduction was made in 1928. The net income for 1927 before deducting amortization was $409,080 which is the amount that should be compared with $733,744 for 1928.

Proposes to Lease Gary & Southern

A proposal that the Gary Railways lease and operate the Gary & Southern Traction Company was submitted recently to the Public Service Commission of Indiana. In this petition, which was filed jointly by the two companies, the Gary Railways proposes to lease the line for ten years and if this lease is approved, it states, operating economies can be effected and service to the public improved.

The Gary & Southern Traction Company operates a 12-mile interurban railway between Gary and Crown Point. The road was purchased last October by the Midland Utilities Company, which also controls the Gary Railways. Since that time it has been operated as an independent property under the direction of Charles W. Chase, president of the Gary Railways.

An extensive rehabilitation program, involving expenditures of approximately $120,000 for new cars, electric substations and track and roadway improvements, has been under way for several months. Stringing of 10 miles of 500,000-circ.mil feeder cable has been completed between the 37th Avenue substation in Gary and the Crown Point city limits and delivery of two new light-weight, one-man interurban cars is expected to be made within the next ten days.

A. W. Robertson—the Man

An intimate study of the newly-appointed chairman of the board of the Westinghouse Electric & Manufacturing Company. What he stands for and what his leadership promises to the electrical industry

By Earl Whitehorne

INTENSE interest among electrical men was aroused when the newspapers announced that A. W. Robertson had been elected chairman of the board of directors of the Westinghouse Electric & Manufacturing Company. It has been nearly two years since the death of General Tripp, and it is known that a diligent search for the right man has been in process. The qualifications were exacting. Here is one of America's outstanding industrial institutions, with a name standing for the highest merit and a fine tradition, seeking aggressive, constructive, creative leadership. The entire electrical industry is concerned because the policies, practices and the prosperity of the great Westinghouse Company profoundly influence electrical progress. The mantle has now fallen upon Robertson of Pittsburgh. And many are asking—"What manner of man is he? What has he done? What will he do to the Westinghouse organization? What will this mean to the electrical industry?"

A. W. Robertson is not generally known in the electrical world. He has not been particularly active in affairs of the industry. He has not been conspicuous at national conventions. But he has made a record for himself in Pittsburgh, as head of the local electric power, railway and gas utilities that is worth studying. And the story of how it came about is interesting.

Sixteen years ago, the superintendent of equipment of the Pittsburgh Railways went to the president one day about a contract that involved considerable money. There was a legal point in doubt. "We ought to have a lawyer right here in the organization," he said. "It would be worth a lot to us." The president agreed and said he would do something about it. He did. A week later he led into the superintendent's office a tall, loose-jointed individual and introduced him. "Here's your lawyer," he said. It was Robertson.

A Master of Public Relations

He was brought in to be useful to the railway and to the light company. He was. The public relations of the railway right then were bad. The situation culminated in the famous Pittsburgh Railways case, of which we needn't talk. Robertson was in charge and by his masterful handling of the matter made a name for himself. He seemed to have an uncanny sense for extracting the truth from a tangled problem. He demonstrated the rare gift of human understanding that wins the confidence of other men and is the greatest single attribute of leadership. He gradually took over the entire legal work of the two utilities, including the claim department. Then he was made responsible for the work of the advertising department, then the service department. Next he became vice-president and general counsel of the Philadelphia Company, which operates the Duquesne Light, the Pittsburgh Railways and the Equitable Gas companies. Seven years after his start with the companies he was elected president. That was two years ago. Under his executive leadership this organization has developed into one of the finest of its kind the industry has seen.



A. W. Robertson

I shall not go into the details. The record is available for closer study. Suffice it to say that the splendid progress of the company is shown in net revenue, in operating efficiency, in the reduction of rates, in the development of the system, in the refinement of the organization, in successful financing and in the improvement of public relations. Among other achievements, the railway has been taken out of a receivership and restored to prosperity.

First, let's get a picture of the man. He was born in the little town of Panama, N. Y., in 1880, one of a family of nine children of Scotch stock. His father died when he was three. He went to the public school. At eleven he began to contribute to the family funds as a wage earner, according to the Scotch tradition. The first job was shoveling snow. He worked after school and in vacations. He was deck hand on a lake steamboat. He sold aluminum pots and pans from door to door. He worked in a saw mill. He kept books. He ran a bath house. He wrote for the local newspaper.

When he finished school he taught two years in the schoolhouse where he had studied. Then he was principal of the high school in Charleroi, Pa., for another two years. At 22 years of age, with $65 total capital, he entered Allegheny College at Meadville. There he paid his way by running a boarding house, winning prizes, writing and doing such other jobs as he could find. From Meadville he went to Pittsburgh, entered law school and on the side started a private school for boys where he taught in the mornings. Afternoons and evenings he studied law.

Made His Start As a Lawyer

He was admitted to the bar in 1910 and joined a Pittsburgh law firm. Next he became title officer of the Guarantee Title & Trust Company, then trust officer. From that position he went into public utility work.

Industry, thrift, and finding ways to make money, all came with the Scotch blood and training, but out of his study of human beings, an idea of his own, has grown a philosophy of management that seeks to accomplish objectives by the development of men to take responsibility. It is undoubtedly the kernel of his present proficiency as an executive.

Naturally Mr. Robertson does not know what he is going to do in the Westinghouse company, and he is not the kind to indulge in any predictions. But the men with whom he has been working in the Pittsburgh utilities know how he will go about the job and what he will accomplish. And what they say is worth considering. There seemed to be no conflict among them as to just what it was that he had done as head of the Philadelphia Company.

The method of the man seems to be—

First, to put responsibility upon individuals and then to provide them with an equivalent authority.

Second, to establish policies by calling in those most interested in the problem and, by the co-ordination of the constructive ideas, chart the course.

Third, having provided men with a policy and a budget, to take the fetters off and set them free to develop their own abilities and apply their own ideas.

He has the patience and tolerance to watch and help men grow and to encourage responsibility by prompting them to make decisions for themselves. Yet, apparently, he does not carry this indulgence to excess. He is a hard worker and a conscientious student of his work. As a lawyer he has learned to do his own thinking. He is an exacting superior only in the sense that he will not accept an obvious explanation, or a conclusion that will not stand the light of logic. He is punctilious in the study of facts. He analyzes all reports closely. He exercises a strong guidance, but he expects a high standard of ability. He takes upon himself no specialized responsibilities. Others in the organization must head up everything. But he will help whenever necessary.

I have never heard men so stress the

helpfulness of a superior. When things go wrong, they go to Robertson because of his sound judgment. There is no anxiety, rather relief, when he comes into it. And that's as fine a testimonial as one could ask.

In an emergency they say he keeps his head with a balanced judgment, free of prejudice and superstition. He habitually tests his judgment by asking two questions—What is the right thing to do? What is the generous thing to do? And when he has the answers, he knows how to proceed.

He is dignified and deliberate and confident in his judgment once his mind is made up, but with it all he is informal, approachable and frank. He has always maintained a close and intimate contact with his organization, riding on the street cars, talking to the linemen as he chances to meet them on the job, visiting the departments and discussing details of the work.

He is deeply interested in civic work and much in demand as a speaker, but he has never been attracted by politics. Yet he has captured the confidence of politicians. As one member of the Pittsburgh City Council expressed it—"When he comes over here and tells us something, we believe it. We don't have to check him up."

Weighing him, then, by the record of his past work, by the measure which those who know him best have given him and by the qualities of mind and character reflected in his personality, I should say that Mr. Robertson will approach the leadership of the great Westinghouse organization with a very simple and clear cut philosophy. He will frankly accept the fact that he has no intimate knowledge of either the personnel or the products of the company and consider it an advantage. He will proceed patiently, methodically and persistently to educate himself.

Perhaps I can best express it in his own words—"My idea," he said to me, "is not to make myself a manufacturer in the sense of having expert knowledge of engineering, of production, or of sales, but rather to understand what the men who have mastered these specialties in the company are doing, and what their problems are and what they need. I am not going to New York and sit in a big front office. I am going to East Pittsburgh, to Mansfield, to Philadelphia and to the other plants and live with this job awhile. I want to talk across a desk with the men and women who make Westinghouse what it is today until I know them as individuals and understand their elements of personal strength and find out how I can help them to develop along the line of their own talent, interest and capacity. Then I will get the real picture, and only then can I attempt some of the things that a chairman ought to do."

There is the keynote of the man's attitude toward management. "Every business as an economic structure" he continued, "must be successful before all else. But every business is the product of the human beings who compose it—and it cannot be greater than they. Few business institutions succeed in making full use of the brains that lie latent within the organization, and it seems to me that this is the test of executive leadership. For, after all, the sole use of management is so to organize the business that a spirit will be created within the personnel which will make its full resources of knowledge, ability and judgment readily available. Then there will be a happy balance of the system—order, invention, initiative and progress—so essential to modern industry."

Confident of the Outlook for the Future

I asked Mr. Robertson if he knew any definite formula for accomplishing this vitalizing process. And of course he said "No." "Naturally," he continued, "there are as many methods as there are people. But there is one simple secret that is ever helpful. There is an unconscious tendency in business not only to fail to give credit to junior members of the organization for their personal contribution of constructive thought and effort, but actually to take it away from them. I have found that there is an unbelievable magic in credit and praise when frankly tendered.

"Our mounting population, our growing cities, the rising standards of modern life, all place a steadily increasing dependence upon electrical equipment of all descriptions for the comforts, conveniences, utilities and the very necessities around which our present scheme of living is organized. Any company engaged in the electrical business has only to do a reasonably fair job under these conditions to have an assured market and provide a satisfactory employment for its personnel and an income for the investor. If, by the exercise of vision, judgment and sagacity, it is able to render a superior service in many of the little ways that mark the relationships between modern industry and the public, it can be certain of a fair measure of prosperity. It is the responsibility of industrial leadership so to encourage, develop and apply the native initiative, ingenuity and resourcefulness of the American engineer, the American mechanic and the American salesman, that organization becomes a creative force for the production of wealth and the increase of human happiness."

I know of no other man who has impressed me more deeply with his human understanding and his maturity of business judgment than Andrew Wells Robertson. The Westinghouse Company and the electrical industry are fortunate that a man of this type comes to the leadership of this great institution. The years immediately ahead will present pre-eminently a period of market development, involving mass education, the selling to all America of the idea of complete electrical equipment in the home, in business and in industry, a full dependence upon electric service for all that it can do within economic limits. For this is needed above all a man who knows people. Mr. Robertson is such a man.

A. J. Boardman Succeeds R. B. Stearns on Eastern Massachusetts

Albert J. Boardman, Brockton, Mass., has been promoted by the Board of Public Trustees to the positions of vice-president and acting general manager of the Eastern Massachusetts Street Railway, Boston. In both positions he succeeds to the duties of R. B. Stearns, who recently resigned. The position of treasurer, also held by Mr. Stearns, has not yet been filled.

Officers Elected in Wisconsin

The following officers were elected at the annual meeting of the Wisconsin Motor Coach Association, on Jan. 22, at the Hotel Loraine, Madison, Wis.: President, F. L. Neilson, general manager La Crosse & Southeastern Transportation Company, La Crosse; vice-president, N. C. Rasmussen, Wisconsin Valley Electric Company, Wausau; treasurer, T. J. Floan, Gray Transportation Company, Green Bay.

The men elected to serve with these officers on the executive committee are: B. W. Arnold, Metropolitan Motor Coach Company, Milwaukee; M. H. Frank, Wisconsin Power & Light Company, Fon du Lac; W. J. Kay, Northland Transportation Company, Minneapolis; H. G. Monger, Wisconsin Motor Bus Lines, Milwaukee.

Messrs. Markham and Brown of Brill Advanced

Fred L. Markham has been appointed acting sales manager of the American Car Company, succeeding Wirt L. Haymond, who died recently. Mr. Markham was for ten years Southern sales representative for the J. G. Brill Company with headquarters in Atlanta, Ga., and was transferred to the American Car Company as sales representative in 1918. He is well known in the electric railway industry, both in the South and Middle West, and is well fitted by experience to assume his new duties.

William Laird Brown, who joined the Brill sales department in April, 1926, has been appointed assistant to the general sales manager, effective at once.

R. S. Soule Assumes Broader Duties With Monongahela

Robert S. Soule has been transferred to the Fairmont, W. Va., offices of the Monongahela-West Penn Public Service Company where he assumed the duties on Jan. 1 of educational director. After successfully conducting a comprehensive program of educational activities in 1927 on the Parkersburg and Marietta divisions, he now has complete charge of all educational activities throughout the entire system. In addition, Mr. Soule will organize and conduct a number of classes in public speaking and dramatics.

Mr. Soule is a graduate of Ohio University at Athens and went with the Monongahela company after three years as instructor in public speaking in the Parkersburg high school and one year with the Mountain State business college.

New Appointments in Vancouver

Creation of an industrial research bureau, with Percy Lewis, former purchasing agent, in charge, and other appointments in the head office organization were announced recently by W. G. Murrin, president of the British Columbia Electric Railway, Vancouver, B. C.

E. W. Arnott is transportation assistant, and A. C. W. Gage fills the office of purchasing agent in succession to Mr. Lewis.

In announcing the establishment of the industrial bureau, Mr. Murrin said it was the purpose of the company to go out actively canvassing for new industries which could, with profit, be established in this territory. Mr. Lewis' department will compile data on all subjects connected with industry. It will be a clearing-house of information and free advice, available to all persons who desire to open new enterprises.

High Honor for B. J. Arnold

Col. Bion J. Arnold, chairman of the board of supervising engineers of Chicago, which exercises control over the Chicago Surface Lines operation, has been selected as the recipient of the Western Society of Engineers' Washington Award for 1929. The award, a bronze plaque, is presented annually to an engineer who has given "pre-eminent service in promoting human welfare through engineering." In past years such prominent engineers as Herbert Hoover, Michael Pupin and Orville Wright have received this award.

Colonel Arnold has been voted the Washington award, according to John A. Garcia, president of the Society, for "pioneering work in engineering and economics of electric transportation." He first gained distinction for his famous intramural railroad at the Chicago World's Fair in 1893. Since then he has been engaged in electrification projects of several railroads and, until recently, was president of the Elgin & Belvidere Railway. He is now president of his own consulting engineering firm with offices in Chicago.

HUGO LUND has resigned as office engineer of the Kansas City Public Service Company, Kansas City, Mo., after a continuous service of 27 years. He desires to give more time to his business interests. Mr. Lund was born in Fort Wayne, Ind., in 1877, of Danish parentage. He was graduated from the University of Illinois in 1902 in mechanical engineering. Mr. Lund entered the service of the railway as draftsman.

OBITUARY

Anthony R. Kuser

Member of group that founded Public Service Corporation of New Jersey. A financier and a philanthropist

COL. ANTHONY R. KUSER died at his ocean estate, Los Incas, Fla., on Feb. 8. He had been ill for several months. Along with Thomas N. McCarter and others, Colonel Kuser was one of the group that founded the Public Service Corporation of New Jersey, supplying transportation services, electricity and gas in that State and one of the largest corporations of its kind in the world. It took a great deal of hard work to bring the Public Service Corporation to its present size and operating efficiency and, while Colonel Kuser as an officer of the company was never much in the public eye, he contributed materially to the advancement of the corporation.

He was a director from the company's inception until last December. He continued as second vice-president from the date of the corporation's foundation in 1903 until 1923 when he resigned as an officer. His business interests were multifarious. Until about 1914 he was a director of the Prudential Insurance Company and at the time of his death was an officer and director in many banking and trust companies. He was one of the participants last June in the dinner to President Thomas N. McCarter, of the Public Service, culminating the celebration of the 25th anniversary of the company's founding. His public benefactions were many, but there was nothing ostentatious about Colonel Kuser.

Governor Edge in 1917 appointed Colonel Kuser as a member of the State Highway Commission. He also served under Governor Fort as a member of the Interstate Bridge Commission, and was chairman of the New Jersey part of that body for a term of three years.

Colonel Kuser was a native of Newark, N. J., where he was born on May 12, 1862. The family moved to the capital, Trenton, when Anthony was about five years old, and in that city he received his early education in the public schools.

Jack Beall

Jack Beall, since 1921 president of the Texas Electric Railway, Dallas, Tex., died suddenly on Feb. 12 of a heart attack. He has been inextricably identified with the life of the Lone Star State. In Texas he was born, educated, practiced law, elected to the Texas Legislature and served as president of a utility covering 246 miles of line and reaching out of Dallas to Corsicana, Denison, Ennis, Ferris, Hillsboro, Sherman and Waco.

It was in 1915 that Jack Beall became one of the general attorneys of the Texas Electric Railway. He had practiced law at Waxahachie and had been elected to the Texas Legislature in 1892 and to the State Senate in 1894. He was elected to Congress in 1902 and served as representative of the Dallas district until he became counsel for the Texas Electric Railway.

In 1921 he was elected president of that company and announced upon assuming his new duties that he would continue the efforts of the late Col J. F. Strickland, notably the building of the interurban line to Terrell. He sought the co-operation of the employees to carry out the same general policy as that of Colonel Strickland.

Mr. Beall was born near Waxahachie on Oct. 25, 1866. He was educated in the country schools of that district and later taught school for several years before he entered the University of Texas in 1886. He was graduated from the university in 1890.

W. L. Haymond

Wirt L. Haymond, sales manager of the American Car Company, died on Jan. 28 in St. Louis. Practically all his business career he was with the Brill organization, which he joined in 1897. His early activities were devoted to the accounting division of the Brill plant in Philadelphia.

On Oct. 1 last, as announced in the Nov. 17 issue of ELECTRIC RAILWAY JOURNAL, Mr. Haymond was appointed to the position he held at the time of his death. Mr. Haymond was born Aug. 31, 1881, at Grafton, W. Va.

Elmer E. Edwards, Sr.

With the death on Feb. 2 of Elmer E. Edwards, Sr., a link between the first horse car days in Minneapolis, Minn., and the present efficient electric railway system disappears. His demise recalls the rapid growth of the Twin Cities, in that their span of life as railway cities is within the life of men active today. Elmer Edwards began to drive a horse car in 1876. When he retired recently he was the oldest employee of the Twin City Rapid Transit Company in service. He drove the first cable car up the Selby Hill in St. Paul and handled the first suburban electric car between St. Paul and Stillwater, Minn. He began with the company when thirteen years of age, July 4, 1876, and the first horse cars began in Minneapolis on Sept. 2, 1875. He drove the car, watched the fares and at the end of perhaps a sixteen-hour day had to wash his car.

ALBERT W. LUCE, formerly auditor for the Hartford & Springfield Street Railway, and later for the Hartford & Springfield Coach Company, died in Springfield, Mass., on Feb. 12. He entered the employ of the Hartford & Springfield fifteen years ago as a clerk, and remained with it up to a year or two ago. He was 46 years old.

Market Activity Continues

One hundred new cars recommended for Cleveland. Improvement planned in Akron. Construction contemplated by Pacific Electric Railway

RECENT announcements of improvement programs, to be executed during the coming year, indicate an active equipment and material market for the next few months. Outstanding among the improvements announced this week is the expenditure of $1,800,000 recommended by Joseph H. Alexander, president of the Cleveland Railway, Cleveland, Ohio, for the purchase of 100 new street cars for that company.

This recommendation was made to the City Council of Cleveland, which, under the Tayler grant, must give its approval before the company acts. At the same time, Mr. Alexander asks authority to scrap 259 old cars, ranging in age from 19 to 29 years. The decision of the railway to recommend the purchase of these new cars followed a three months' survey, which disclosed that it would be impracticable to rebuild the old equipment.

These new cars will be of the same type as the 50 cars put in service last year. These cars, which were described in the JOURNAL of July 21, 1928 are of the single-end, double-truck, motor-driven Peter Witt type for one-man or two-man operation. The cars are 53 ft. 6½ in. long, 8 ft. 6 in. wide, weigh 44,800 lb. and seat 55 passengers. The bodies are of semi-steel construction with arch roofs, sliding center doors and folding end doors. The trucks have a wheelbase of 6 ft. and are equipped with two inside hung motors, roller bearings, and 26-in. steel wheels.

No additional articulated units are contemplated at this time, as the railway already has 25 of these trains, and authority to purchase three more. This is a sufficient number of this type to operate on the Euclid Avenue line, which is the only line in the city on which articulated operation is practical in the non-rush hour periods.

IMPROVEMENTS IN AKRON

The City Council of Akron, Ohio, has asked the Northern Ohio Power & Light Company to carry out an improvement plan which would require the expenditure of more than $2,000,000 during the next four years. To extend and improve the system, this plan calls for the purchase of 90 new buses at a cost of $1,275,000, and railway development to cost in excess of $1,000,000. Much of this railway expenditure is in connection with the city's street improvement plan and the extension of the Arlington Street line. The Arlington installation alone will cost approximately $195,500.

The city plans also call for the widening of East Exchange Street, which would necessitate changes costing the railway more than $250,000. Another improvement is the widening of East Market Street from College Street to Carrol Street, involving the expenditure of $105,700 by the railway. Other improvements are planned, ranging from $3,700 up to $34,900.

More than $2,500,000 was added to the capital account of the Kansas City Public Service Company, Kansas City, Mo., through deductions for improvements and maintenance last year. The exact amount added to capital as shown in the report was $2,591,377.71. The total cost of the improvements was $4,679,186.28, out of which more than $2,000,000 was charged to deferred maintenance. A large portion of the amount was spent on rebuilding and renewing track.

The Illinois Terminal Railroad System has put into service 100 new box cars manufactured by the Mount Vernon Car Company, Mount Vernon, Ill. A feature of these new cars is that the roofs are covered with canvas. They are also heavily lined and equipped to handle any kind of merchandise, including grains and perishable products.

The United Electric Railways, Providence, R. I., has recently purchased 2 miles of No. 00 hard drawn trolley wire, 500 12-in. trolley ears, 500 ft. of 1,000,000 circ.mil rubber-covered waterproof cable, 200 insulators, 500 caps and cones, and 100 feeder ears. This company has also ordered 100 lb. of welding wire, 25 bales of waste, 300 yd. of 36-in. shade cloth, 24 34-in. steel car wheels, 1,400 cast grids, 50 5½-in. trolley wheels and 100 phosphor bronze axle bearings.

Exhibitograph No. 4

A.E.R.A.
EXHIBIT COMMITTEE

Held its first meeting on Feb. 5 and completed plans for the

BIG SHOW

in

NEW
ATLANTIC CITY
AUDITORIUM

SEPT. 28 TO OCT. 4

Plan now to exhibit

NEW YORK SUBWAY PROGRESS

Contracts will soon be let for 300 new steel cars for the main line of the municipal subway from 212th Street to Chambers Street, New York, N. Y., and contracts for a ten-year power supply will soon be advertised. Already $176,000,000 in contracts have been let in Brooklyn, Queens, Manhattan and the Bronx, providing for 21 miles of four-track road, with at least $100,000,000 more to be let this year.

The 53rd Street crosstown line of the city's subway system, is said to be a year ahead of the schedule, which calls for a line from Eighth Avenue, Manhattan, to Long Island City by 1931. Bids for the Houston Street crosstown line on the lower east side have already been received and bids will soon be asked for part of the Sixth Avenue line. Work on the Sixth Avenue extension, and lines along Church Street and Fulton Street, and under the East River to Brooklyn, is described as being prosecuted with all possible speed, while rapid progress is being made on the Bronx Concourse line, which will join the Manhattan line at 148th Street and St. Nicholas Avenue. Five contracts have been awarded on the Bronx line, totaling $28,000,000. It is expected that the entire route will be under contract by the end of this year. Substantial progress is reported on construction of the new subway lines in the Greenpoint section of Brooklyn and $15,000,000 worth of contracts have been let for sections in Long Island City, Queens.

Six cars of poles, two cars of cables, and one car of weatherproof wire have recently been purchased by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. This company is planning to construct a new terminal at 27th and Hopkins Streets.

The Twin City Rapid Transit Company, Minneapolis, Minn., has purchased 15,000 white oak ties and 10,000 cedar ties, 14,000 ft. of 3-in. bridge plank, and 10,000 4½-in. standard granite paving blocks. This company has also purchased 30,000 lb. of Viscaline lubricant.

PACIFIC ELECTRIC CONSTRUCTION

The Pacific Electric Railway, Los Angeles, Cal., plans a power substation at Los Nietos, Cal., to cost $45,000. This company also plans to lower its tracks to grade at five crossings on the Long Beach and Wilmington line. As in the case of grade separations, the city has made it a practice heretofore to con-

tribute toward the cost of reducing tracks to grades at crossings where they were above the grade. In this case, however, the city is objecting to this cost, as it is claimed the railroad's franchise provides that its track should be constructed at the street level.

The United Railways & Electric Company, Baltimore, Md., plans a power substation to cost $40,000. The Pacific Gas & Electric Company, San Francisco, Cal., will make additions to its local power plant, and the Great Northern Railway, Seattle, Wash., plans a power plant to cost approximately $30,000. The Southern Pacific Motor Transport Company, San Francisco, Cal., which is controlled by the Southern Pacific Company, has placed orders for nine six-cylinder parlor type 25-passenger Fageol coaches, and three six-cylinder 31-passenger coaches. The city of Seattle has purchased 125,000 lb. of copper wire, 5,000 insulators, 10,000 ft. of signal cable, and called for bids for 1,200 ft. of 5,000-volt lead covered cable.

Brooklyn Subway Tests Roller Bearings

Five of the triplex subway cars, operated on the rapid transit lines of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., have been equipped with Timken roller axle bearings and have been placed in operation on the Sea Beach line for tests and observation as to the degree to which they increase the smooth-riding qualities of the cars. Three of the cars have also been equipped with roller armature bearings.

These five triplex cars are the first subway cars to be equipped with roller bearings, and the results of their operation on the B.-M. T. lines will be followed with interest by rapid transit operators. During the past two years cars equipped with roller bearings have been operated on steam railroads and surface cars and their adaptation to the intensive service of the city subway lines is the latest step in the development of this branch of transportation equipment.

Twin Coaches Reviews Year

At the annual meeting of the Twin Coach Company held recently, the present board of directors was re-elected. In his review of operations of the company for the past year, the president, F. R. Fageol, stated that since the delivery of the first Twin Coach in July, 1927, the company has attained second position in sales volume to electric railway operators and has attained first position in its sales volume of 40 passenger-capacity coaches for 1928. Total sales volume for the year 1928 was in excess of $4,300,000, with Twin Coach products now in use by 58 transportation and utility companies.

The treasurer's annual report discloses net operating profit for 1928, before deduction of federal taxes, of $529,264.64, as compared with a net operating loss for 1927 of $176,065.55. After absorbing $100,000 of 1927 operating loss, providing for federal income taxes and other surplus charges, but before providing for preferred dividends, the company's balance sheet shows a surplus of $328,429.59. The balance sheet discloses current assets of $1,815,541.23, with current liabilities of $949,951.91 or a net current asset position of $865,589.33.

The board of directors, at their meeting immediately following the annual meeting of the shareholders, re-elected the present officers and declared all the accumulated dividends on the preferred stock to Dec. 31, 1928, payable in four equal payments, the first of which is to be paid Feb. 20, 1929, and the balance at the discretion of the directors, but before June 30, 1929.

Industrial Truck Association Formed

Formation of the Industrial Truck Association, composed of manufacturers of electric industrial trucks, tractors, storage batteries and accessory equipment, has been announced. The association is a development of the co-operative sales promotion activity which these manufacturers have conducted for the past three years through The Society for Electric Development.

The new association headquarters are located at 52 Vanderbilt Avenue, New York City. C. B. Crockett has been retained as secretary in charge of the staff operations.

Supported by initial membership from fourteen companies producing over 90 per cent of the products of the industry, the Industrial Truck Association, organized in the interest of co-operative sales promotion, has for its purpose the broadening of present markets, education of the public and the solution of materials handling problems by the use of mechanical equipment.

The board of directors is comprised of the following: President, M. S. Towson, president Elwell-Parker Electric Company, Cleveland, Ohio; vice-president, E. J. Bartlett, president Baker-Raulang Company, Cleveland, Ohio; vice-president, W. C. Allen, president Yale & Towne Manufacturing Company, Stamford, Conn.; treasurer, G. A. Freeman, president Automatic Transportation Company, Inc., Buffalo, N. Y.

Phoenix Cars Delivered

Installation of eighteen new 40-passenger, one-man, two-man street cars on the system of the Phoenix Municipal Railway, marks the completion of the $750,000 rehabilitation program which has been carried out by the city of Phoenix, Ariz. This city, the capital of the state, is one of the most rapidly developing cities of the Southwest. In 1925 when the railway was purchased by the city, the entire system was in need of rehabilitation. A $750,000 bond issue was passed and the city initiated an extensive rebuilding and equipment renewing program.



Deep type spring cushions were made possible on the rattan covered seats by means of leather edges

The cars are of the city, double-end, double-truck type, each seating 40 passengers. They are 39 ft. 1 in. long, 8 ft. 5 in. wide and weigh 30,000 lb. The bodies are of semi-steel construction with arch roof and folding end doors. The car exteriors are painted an orange and ivory color and the interior trim is finished in mahogany. The seats are unique in construction in that they are covered with a combination of rattan and leather. The rattan gives a very durable wearing surface while the leather around the edge of the cushion provides sufficient flexibility to permit the use of the more comfortable type of deep spring cushions.

The trucks of these cars are spaced 16 ft. 10 in. on bolster centers and have a wheelbase of 5 ft. 1½ in. Each truck is equipped with two 25-hp. inside hung motors and 26 in. steel wheels. Plain type journal bearings are used. Detailed specifications and plans were published in the Oct. 6 issue of ELECTRIC RAILWAY JOURNAL.



One of the new cars built for the Phoenix Municipal Railway by the American Car Company

Milan Orders Tool Steel Gears

The Tool Steel Gear & Pinion Company, Cincinnati, Ohio, reports that it has just received a cabled order from Milan, Italy, for 1,200 additional sets of quiet type Tool Steel gears to complete the rebuilding program being conducted in that city. This order follows one for 830 sets of Tool Steel gears placed last year, when the present remodeling program was initiated. These orders resulted from a number of tests on this type of gear started in Milan several years ago.

DeVilbiss Reorganizes

The reorganization of The DeVilbiss Company, Toledo, Ohio, following the death of the founder and president, Thomas A. DeVilbiss, has placed Allen D. Gutchess, a nephew of Mr. DeVilbiss, in charge of this company.

Other new officers are William M. Booker, chairman of the board; Frank A. Bailey, vice-president and general manager; William F. Gradolph, general sales manager; Frank C. Penoyar, secretary; Walter W. Conklin, treasurer; and Howard DeVilbiss, son of the founder, assistant secretary.

ELECTRIC RAILWAY MATERIAL PRICES—FEB. 13, 1929

Metals—New York

Copper, electrolytic, cents per lb.	17.775
Lead, cents per lb.	6.85
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	6.35
Tin, Straits, cents per lb.	49.625
Aluminum, 98 to 99 per cent, cents per lb.	23.90
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	53.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago	1.425
Central, Ill., screenings, Chicago	1.025
Kansas screenings, Kansas City	1.70

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.90
Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb.	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.6
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	18.
Waste, cotton (100 lb. bale), cents per lb.:	
White	17.25
Colored	13.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	10.6
White lead in oil (100 lb. keg), cents per lb.	13.1
Turpentine (bbl. lots), per gal.	$0.63
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	5.90
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½ 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.375
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.375
Sand, cu.yd., delivered	2.125

Old Metals—New York and Chicago

Heavy copper, cents per lb.	15.125
Light copper, cents per lb.	12.875
Heavy yellow brass, cents per lb.	8.875
Zinc, old scrap, cents per lb.	3.375
Lead, cents per lb. (heavy)	5.25
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	19.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	10.25

TRADE NOTES

NORTHERN EQUIPMENT COMPANY, Erie, Pa., has appointed Bradshaw & Company, 530 Fourth Avenue, Pittsburgh, to represent the Copes System of Boiler Feed Control in the Pittsburgh district. Grant D. Bradshaw is president of this newly orgagnized firm, which is to specialize in power plant equipment. Mr. Bradshaw was formerly president of Andrews-Bradshaw Company from its organization in 1915 until its consolidation with Blaw-Knox Company on Jan. 1, 1928.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, announces the recent appointment of new district sales representatives. J. E. Durstine has been advanced to district sales representative for the Southeast with headquarters at Birmingham, Ala. A promotion places H. P. Egan as district sales representative for central Ohio with headquarters at Columbus, Ohio.

WIGHTMAN-HICKS, New York, N. Y., announces that C. J. C. Clarke has become a vice-president of its organization. Mr. Clarke has had wide experience in the industrial field, as sales manager and advertising manager for various companies. For the past three years he has been with the McGraw-Hill Publishing Company, and for the four years preceding with the Periodical Publishing company.

FITZJOHN MANUFACTURING COMPANY, Muskegon, Mich., has recently opened offices at Detroit. The office will be in charge of F. W. Feeney, Detroit manager, located at 5-208 General Motors Building.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has announced the election of William J. Hanley, manager of the East Central district with headquarters in Cleveland, and Charles K. West, manager of the Atlantic District with headquarters in Philadelphia, as vice-presidents in charge of the commercial activities of the company in their respective districts.

C. F. PEASE COMPANY, Chicago, has established a new Pacific Coast sales office at 501 South Spring Street, Los Angeles, Cal., under the direction of Ralph S. Gibson, Western sales manager, who will devote his entire attention to the Western Coast.

ADVERTISING LITERATURE

WAGNER ELECTRIC CORPORATION, St. Louis, Mo., has issued bulletin No. 138 entitled "Manual of Electric Testing." This manual gives detailed descriptions and diagrams of methods of making resistance measurements and methods of connecting ammeters, voltmeters and wattmeters for the measurement of power, and motor testing. The various motor tests described include single-phase motor tests; the three-phase motor test, the voltmeter and ammeter method; three-phase motor test by two wattmeter method; three-phase motor test, polyphase wattmeter method; three-phase motor test, one wattmeter method; three-phase motor, one wattmeter and Y-box method; three-phase motor with neutral brought out, single-wattmeter method; temperature test, three-phase induction motor; alternating current generator excitation or magnetization curve test; three-phase alternating current generator, synchronous impedance test; three-phase, alternating current generator, load test; three-phase generator or synchronous mator temperature test; and direct current motor or generator magnetization test. Other tests described and illustrated include a direct current shunt motor temperature test; and direct current generator external characteristics; direct current shunt motor or generator, temperature test, loading back method; direct current generator (compound), external characteristic, adjustable load; transformer testing; insulation tests; core loss test; copper loss test; insulation resistance test; polarity test; winding and ratio test; temperature rise test, and efficiency.

CARNEGIE STEEL COMPANY, Pittsburgh, Pa., has issued a booklet entitled "Carnegie Beam Sections." This booklet thoroughly covers with illustrations and tables the profiles, properties and safe loads for additions to the new series of structural steel beams and column construction.

OHIO BRASS COMPANY, Mansfield, Ohio, has issued supplement No. 2 to catalog No. 20, which supersedes and replaces supplement No. 1, dated March, 1928. This supplement gives illustrations and detailed descriptions of all products announced since the issuance of catalog No. 20.

NORTH EAST ELECTRIC COMPANY, Rochester, N. Y., has just issued a new edition of its Bus Catalog, 100-B. This catalog lists its complete line of heavy-duty generators, starting motors, ignition, control units, horns and speedometers. It is available on request.



Sentinels of SAFETY



Electric cars protected by a set of Peacock Staffless Brakes are safe. Safe for your passengers to ride in, and safe for your motorman to operate.

Like sentinels of safety, they stand on guard protecting your investment against loss from accidents and law suits.

For Peacock Staffless Brakes not only wind up chain much faster than any other type of brake, but also enable the motorman to keep his car under control at all times, permitting him to exert thousands of pounds of braking force with very little effort. But even more important is the fact that these hand brakes are designed to take up an unlimited amount of chain slack. They always function no matter how worn the shoes may be, or how slack the rigging.

NATIONAL BRAKE CO., Inc.

890 Ellicott Avenue, Buffalo, N. Y.

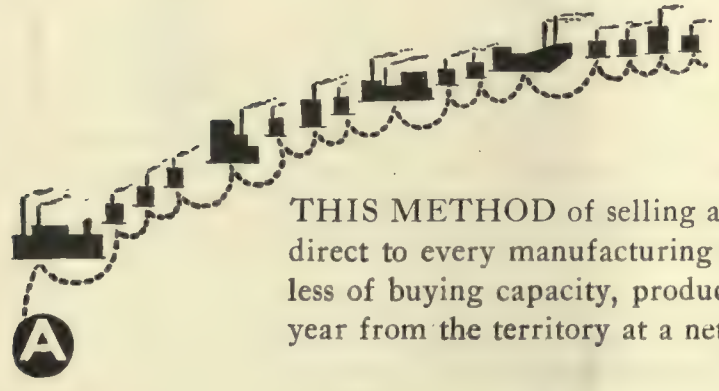
Canadian Representative: **Lyman Tube & Supply Co., Ltd., Montreal, Can.**
The Ellcon Company—General Sales Representatives, 50 Church St., New York

PEACOCK STAFFLESS BRAKES

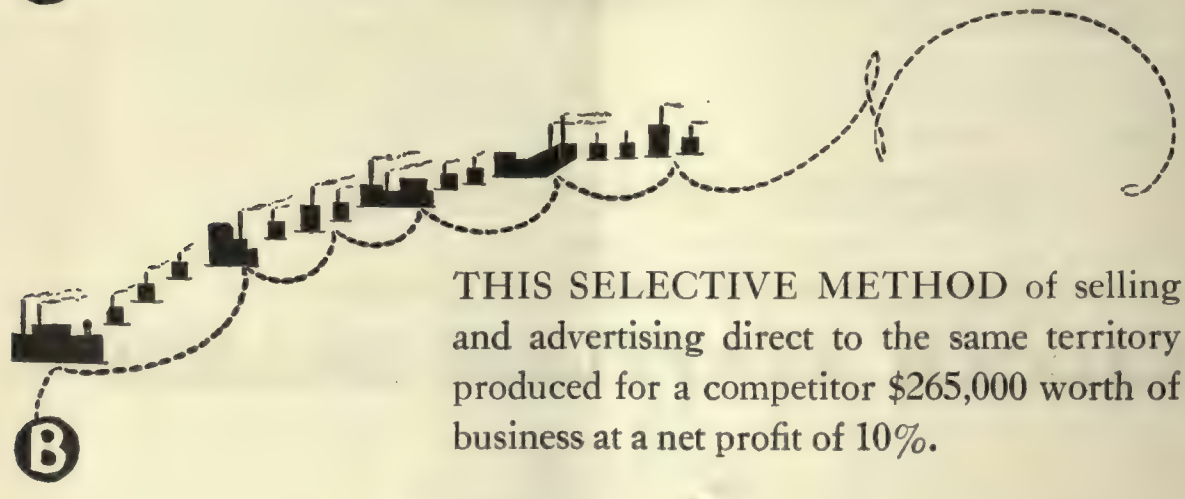


This is one of a series of McGraw-Hill advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

VOLUME *vs.* PROFITS



THIS METHOD of selling and advertising direct to every manufacturing plant, regardless of buying capacity, produced $250,000 a year from the territory at a net profit of 2%.



THIS SELECTIVE METHOD of selling and advertising direct to the same territory produced for a competitor $265,000 worth of business at a net profit of 10%.

Practical Industrial Advertising Coverage, like practical sales coverage, is a problem of selecting the plants with buying capacity and directing sales and advertising effort thereon.

You are invited to make at any time a personal inspection of McGraw-Hill circulation methods which produce the Practical Industrial Advertising Coverage illustrated in "B."

—The publishers

1000 miles *of* route ~





Passenger Comfort MUST Come from the Buses



Note the ample inside luggage space in this magnificent "Palace Highway Pullman"—rack lined with velour to protect bags against scratches or mars. Full head room. Seats 35 people—29 permanent chairs and 6 removable type convenient folding aisle seats. Inside width exceeds any body built for the same outside dimensions. Handy adjustable drop curtains for elastic segregation space at rear.

OVER paved roads, through dirt and mud—unpaved or paved roads, Bender Bodies are giving 100% satisfaction under all conditions for the Southwestern Transportation Co. of Little Rock, Arkansas.

There's *durability built* into Bender Bodies—*durability* which means that they stand up under the hardest use and yet give that essential comfort to passengers which builds bus business.

You want both comfort and convenience for your riders, and you want durability—low maintenance. Bender gives them all.

THE BENDER BODY CO.
W. 62nd and Denison, Cleveland, Ohio



Aluminum coated roof—keeps heat from penetrating—increases visibility of coach on the road—additional riding ease and appointment comforts for passengers—additional business for operators.

BENDER BODIES



A good foundation upon which to accomplish low operating costs.

GASOLINE supplies the power that turns the wheels of your motor buses, provides the energy that carries the hills with a rush, furnishes the force that speeds the miles by—and demands the largest percentage of your operating expense.

Much of the variation in high and low cost bus operation originates in the fuel tank, caused by the varying performance of gasoline. Some gasolines are better motor fuels than others, some produce a smoother flow of power, give greater mileage. It is a significant fact that many bus operators in the Middle West who are basing their fuel costs on mileage are using Red Crown Gasoline. They have found that Red Crown gives them more mileage per gallon, that it develops maximum power in bus engines, that it burns cleanly, leaving a minimum carbon deposit.

Let Red Crown prove these statements. Try it in one of your buses. Compare its performance and economy with the fuel you are now using.

STANDARD OIL COMPANY *(Indiana)*

General Offices: **910 South Michigan Avenue** **CHICAGO, ILLINOIS**

ILLINOIS
Chicago
Decatur
Joliet
Peoria
Quincy

INDIANA
Evansville
Indianapolis
South Bend

KANSAS
Wichita

WISCONSIN
La Crosse
Milwaukee
Green Bay

IOWA
Davenport
Des Moines
Mason City
Sioux City

S. DAKOTA
Huron

N. DAKOTA
Fargo
Minot

MICHIGAN
Detroit
Grand Rapids
Saginaw

MINNESOTA
Duluth
Mankato
Minneapolis

MISSOURI
Kansas City
St. Joseph
St. Louis

814





No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

HEYWOOD-WAKEFIELD COMPANY

Boston, Massachusetts

516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

To keep "last cost" down!



To help increase volume of business by providing reliable and more comfortable transportation; to help increase profits by minimizing costs of maintenance and operation—these are the results to which Timken Worm Drive Axles are built. They are permanently *silent*.

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

If inspectors rode every car on every trip

you would not get the supervision and protection provided by this register

NO amount of human observation and checking can take the place of the *printed records* made by the National Fare Register, of the *public indication* visible to passengers in the car, of the *locked-up total,* showing all cash taken in, and of the protection of the *printed ticket.*

Interurban operators have found just what these features mean in actual use. They have found receipts increased when these registers were installed. They have found that passengers no longer over-ride without paying the proper fare. They have found the printed trip sheet an invaluable record for traffic and accounting purposes.

Considering fare collection from every standpoint, this register sets new standards for speedy operation, accurate and complete records and protection of receipts

Our representative in your headquarters city will be glad to arrange a demonstration and to give complete details on this machine.

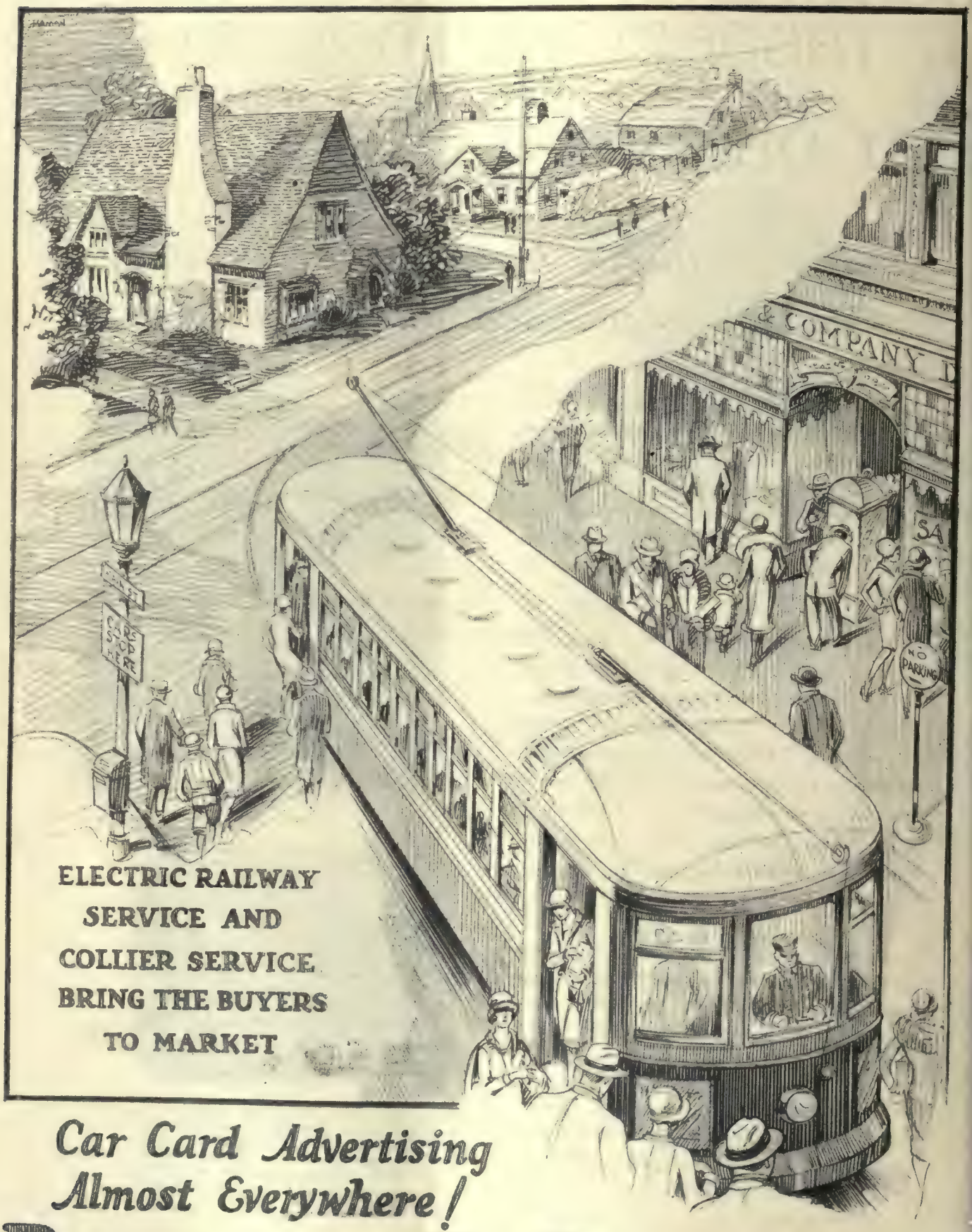




The quick action, flexible keyboard of a National Fare Register does much to speed up loading and recording of fares. Only one key need be pressed on repeat fares. The speed and positive action of this keyboard is invaluable.

The National Fare Register

Product of The National Cash Register Company



Car Card Advertising Almost Everywhere!

BARRON G. COLLIER INC.

NEW YORK CITY



PROVED PRODUCTS
the Mark of DeVilbiss Leadership

THE greater economy effected by DeVilbiss Spray Systems in electric railway finish maintenance is a definitely known and conclusively proved advantage. The suitability, worth, and efficiency of any DeVilbiss product offered for your use are definitely established by comprehensive tests made under the identical conditions that obtain in the practical use of such equipment.

In order to provide the absolute assurance of good performance and durability of all the various units of a spray-finishing outfit, it is necessary for the DeVilbiss organization to itself manufacture materials and parts usually procured from other supply sources. An example is De Vilbiss Fluid Hose made from the crude rubber and other raw materials in a great department installed within the DeVilbiss plant. Before it is stocked for sale, specimens from each lot manufactured are placed in a testing machine and bent back and forth 2,000,000 times, while turpentine heated to 120 degrees is passed through the hose under pressure. Hose that softens or breaks under this drastic test is rejected. This is one reason why DeVilbiss Fluid Hose lasts long after other and inferior products are broken and useless.

To a like degree is tested and proved each and every separate part of a De Vilbiss Spray System—spray gun, air compressor, paint tank, air transformer, spray booth, exhausting fan. The first day's use will reveal the greater practical efficiency of a DeVilbiss product. Years of operation under the most exacting conditions will reveal the infinitely higher quality and far greater investment value of De Vilbiss Spray-Painting and Finishing Outfits.

De Vilbiss makes a specialized outfit for every painting or finishing operation in every occupation, business, or industry. It will pay you to learn about the proved equipment that DeVilbiss has provided for your particular need. We will gladly tell you about it.

Spray guns of various types and sizes

Pressure feed paint tanks and containers

Spray booths, exhaust fans, and approved lighting fixtures

Air compressing equipment

Air transformers and accessories

Air and fluid hose and connections

Complete outfits from the smallest hand-operated units to the largest industrial installations

THE DEVILBISS COMPANY · 272 PHILLIPS AVENUE · TOLEDO, OHIO

DeVilbiss
Spray-PAINTING FINISHING System

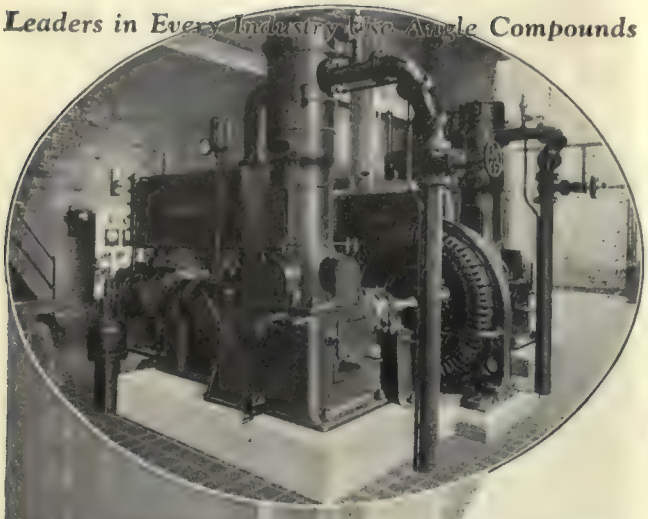
Sales and Service Branches:

NEW YORK CHICAGO
PHILADELPHIA ST. LOUIS
CLEVELAND DETROIT
INDIANAPOLIS
SAN FRANCISCO
WINDSOR, ONTARIO

Direct Factory Representatives In All Other Territories

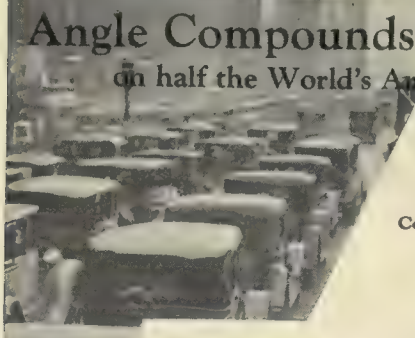
DOES THE WORK OF FIVE MEN

Leaders in Every Industry Use Angle Compounds



Angle Compounds Cut Costs

on half the World's Automobiles



One of many Angle Compound Compressors in the plant of a large Automobile Manufacturer.



Where Production Savings Earn the Profits Distinctive Balanced Angle Compressors Help.

Motor-car prices continue to fall. Savings in production must earn the profits.

Every manufacturing process, and every machine that might reduce the cost per car, comes under close scrutiny—

—and builders of half the world's automobiles now use Sullivan Angle Compound Air Compressors.

Angle Compounds supply compressed air for less money, in power, maintenance, and floor space—due to balanced angle design, and multi-step control.

When you turn to air power, to increase profits, remember Angle Compound Compressors. They will give you—as they give leaders of every industry—most for your money in air power.

Sullivan Compressor capacities are 68 to 3100 cu. ft. per min.
Send for Catalog 83-J.

SULLIVAN
MACHINERY COMPANY
150 S. MICHIGAN AVE., CHICAGO

BALANCED ANGLE COMPOUND SULLIVAN

SULLIVAN TRADE MARK



A Type for Every Need



For 35 years we have been studying trends and anticipating pole needs of the Electric Railway Industry. As it progressed and grew we have been ready. Today, as always, there are Elreco poles to meet every requirement of the operators.

Elreco poles combine great strength with light weight, accessibility, economy and beauty. Trolley, span lighting wires, lighting units, traffic signals may be all suspended from the same pole.

Three or four companies utilize one pole. Obviously installation and maintenance costs are minimized.

Yet with all their rugged strength and features of economy, Elreco pole design embodies the trim appearance that lends dignity to any thoroughfare.

Let us explain in more detail why Electric Railway Companies everywhere are installing Elreco Tubular Steel Poles. *Write*—

The Electric Railway Equipment Company

2900 Cormany Ave. Cincinnati, Ohio.
30 Church St. New York, N. Y.

2444 Cars per day

use this silico-manganese weldable crossing

THE new Silico-Manganese Special Trackwork recently introduced by Bethlehem combines weldability with high resistance to shock and wear.

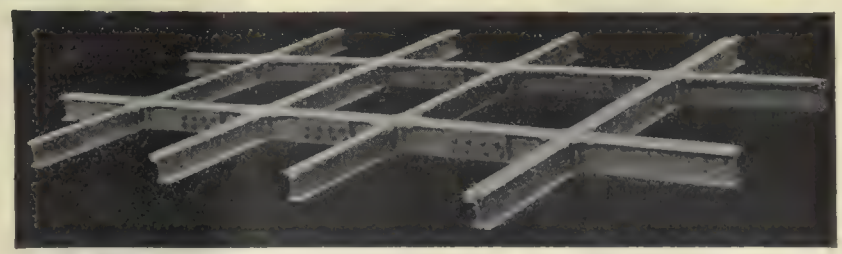
This trackwork is being used in many locations where service is unusually severe. An example is the installation of a Bethlehem Silico-Manganese Crossing at 12th and Market Streets, Philadelphia. An average of 2444 heavy double-truck cars go over this crossing every day.

Bethlehem Weldable Special Trackwork — called design No. 999 — combines virtually all of the desirable features of the best previously-used forms with the great advantage of being easily repaired by welding. It is recommended for your 1929 requirements.



12th and Market Streets, one of the businest intersections in Philadelphia. A Bethlehem Silico-Manganese Crossing is installed at this point.

Below is the Bethlehem Silico-Manganese Crossing before installation at 12th and Market Streets, Philadelphia. Note the welded construction.



BETHLEHEM STEEL COMPANY

General Offices: **Bethlehem, Pa.**

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

Bethlehem Steel Export Corporation, New York City. Sole Exporter of our Commercial Products.

BETHLEHEM

TULC A LUBRICANT

TULC lubrication is CORRECT lubrication

Round plugs don't fit square holes—nor does ordinary oil properly lubricate specialized machinery.

TULC lubricants are scientifically manufactured—to go farther—last longer—and really LUBRICATE.

There is a grade of TULC for each job.

And TULC does each job well!

THE UNIVERSAL LUBRICATING CO.

1400 Schofield Bldg., Cleveland, Ohio



Like old friends, they wear well

Our oldest friends we like the best, because they've stood the test of time, remained the same in spite of change.

Boyerized Parts, old friends of most electric railway men, are also known for their reliability and wearing qualities in face of changes in the field. For with their glass hard armor, they outlast the ordinary heat-treated parts four or five times. So, naturally, they've specified again when it comes to reorder or replace.

Spring Post Bushings
Spring Posts
Bolster and Plates
McArthur Turnbuckles
Manganese Brake Heads
Managanese Truck Parts
Bronze Bearings
Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Center Bearings
Side Bearings
Case Hardened Bushings
Transom Chafing
Brake Fulcrums
Forgings
Trolley Pins

BEMIS CAR TRUCK COMPANY
ELECTRIC RAILWAY SUPPLIES
SPRINGFIELD, MASS.

Representatives:
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Brake Bushings
Bronze Bearings
Bolster and Transom Chafing Plates
Spring Posts
McArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts

BOYERIZED PARTS

They took double precautions *when they surfaced this bridge!*



Spy Run Bridge, Fort Wayne, Indiana, doubly protected against traffic impact by Carey Elastite Asphalt Plank and Carey Elastite System of Track Insulation.

WHEN they modernized the Spy Run Bridge, at Fort Wayne, the Indiana Service Corporation did a *thorough* job. First, they safeguarded the structure by applying Carey Elastite Track Insulation. Protection against vibration—a cushion for the rails.

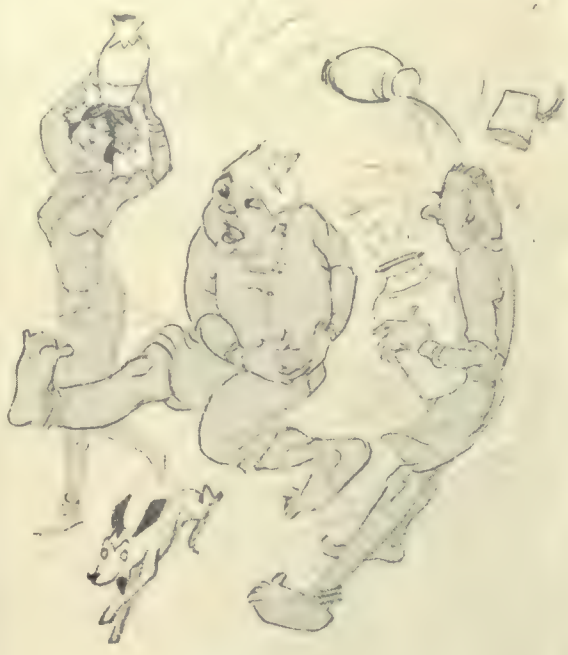
And . . . they floored the bridge with Carey Elastite Asphalt Plank, more than five thousand square feet of it, applied, in two-inch thickness, over a wood decking. A flooring that quiets trusses and struts—a surface that knits and heals under traffic.

Of course, you will want us to tell you more about this unique combination of Carey Elastite Asphalt Plank and Carey Elastite Track Insulation—how their application guarantees a low-maintenance surface that is lastingly smooth. Shall we send you facts and detail drawings?

The Philip Carey Company
Lockland, Cincinnati, Ohio

Carey Elastite
REG. U.S. PAT. OFF.
TRADE MARK REG'D. U.S. PATENT OFFICE

SYSTEM OF
TRACK INSULATION



LAL PANI

In India the native must drink a pint of his home brewed lal pani (red water) before offering it to a neighbor.

We admire this because it has always been our contention that the customer should never do the experimenting with Morganite brushes.

New developments, such as the electro graphitic grades of Morganite did not reach the customer until they had proved themselves on widespread test application.

Experimentation, like fermentation, should begin AND END at home.

Morganite Brush Co., Inc.

Main Office and Factory
3302-3320 Anable Ave., Long Island City, N. Y.

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building.
Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.
Revere, Mass., J. F. Drummey, 62 Pleasant Street.
Los Angeles, Electrical Engineering Sales Co., 502 Delta Bldg.
San Francisco, Electrical Engineering Sales Co., 222 Underwood Bldg.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 133 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 898 St. Antoine St.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.



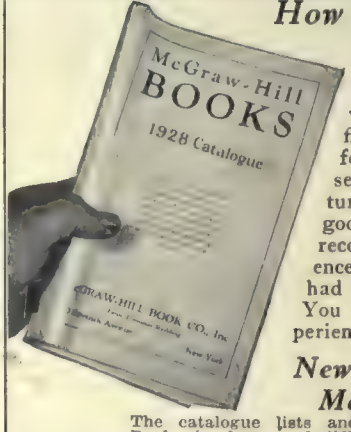
Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



How to keep up with your field

How do you keep in touch with developments in your field? Where do you turn for reference, study or research? Where can you turn? What's available? A good part of the written record—the "canned experience" of your field is to be had in McGraw-Hill Books. You have the key to this experience in the

New 1928 Catalogue of McGraw-Hill Books

The catalogue lists and describes all McGraw-Hill Books in dozens of different branches of dozens of different fields.

It gives you the key to the existing literature on many different scientific engineering and business subjects.

It is a valuable catalogue to have handy and a copy is waiting for you if you want one. Just send us your name and address.

Handy Plan for Your Book Buying

The catalogue describes a plan whereby you can put your book-buying on a convenient budget basis—get the books that you want as you need them—pay for them by the month as you use them.

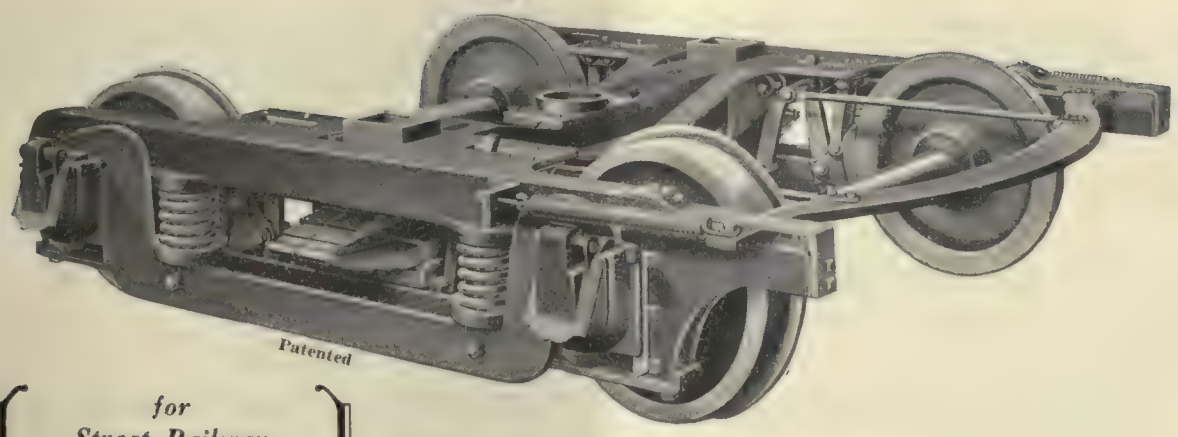
Send for a copy —it's free

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, N. Y.

Send me the NEW 1928 McGRAW-HILL CATALOGUE to the address given below. The catalogue is free, I understand.

Name .....
Address .....
City and State .....

E. 2-16-29



for
Street Railway Service

Steel frames, including cross transoms and pedestals cast in one strong unit.

Pedestals are machined and protected from wear by renewable, hardened spring steel lines.

Eliminate truck maintenance

Reduction of maintenance cost is an important factor in profitable operation. As far as your trucks are concerned you can practically eradicate it by adopting Commonwealth Trucks. In doing so you will be following the lead of many of the most important railways.

COMMONWEALTH STEEL COMPANY
GRANITE CITY, ILLINOIS

LORAIN

Girder Rails, Special Trackwork, Switches, Frogs and Crossings in Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail

The Lorain Steel Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION
General Offices: Johnstown, Pennsylvania

Sales Offices:

Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh

Pacific Coast Distributors: United States Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
Export Distributors: United States Steel Products Co., New York

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
39 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation
Engineers — Constructors
Steam and Hydro-Electric Power Plants, Gas Plants, Steam and Electric Railroads, Transmission Systems, Buildings and Industrial Plants.
43 Exchange Place New York

STONE & WEBSTER
Incorporated
Design and Construction
Examinations Reports Appraisals
Industrial and Public Service Properties
NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION
Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
Appraisals—Management
52 Vanderbilt Ave. New York

SANDERSON & PORTER
ENGINEERS
PUBLIC UTILITIES & INDUSTRIALS
Design Construction Management
Examinations Reports Valuations
CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST
Consulting Engineers
Appraisals Reports Rates Service Investigation
Studies on Financial and Physical Rehabilitation
Reorganization Operation Management
683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

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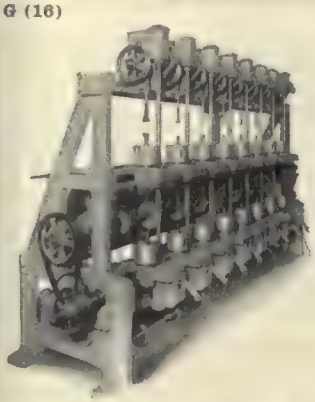
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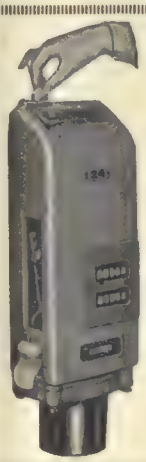
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Better Quality Seats For Cars and Buses

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and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 5000 already in use.

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SUPERINTENDENT transportation, broad experience, established successful record city, interurban railways, buses. Will accept position of assistant with future. Salary and location secondary importance. Fine references. PW-162, Electric Railway Journal, Tenth Ave. at 36th St., New York.

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These registers with B-10 horizontally operating backs and B-9 vertically operating backs are almost new. Most of them have been in service less than a year and none more than 2½ years. All are in first-class operating condition.

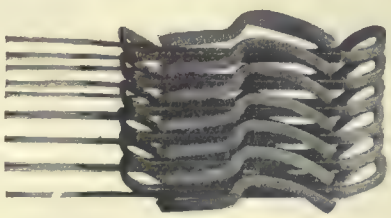
They are for sale because a change in rate of fare made it necessary to equip all I. R. C. cars and buses with a multi-fare register.

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You Want What You Want When You Want it

—and Good Used Equipment may often meet an urgent temporary need—or a permanent one.

They're Remarkable!



The performance records of Elliott-Thompson coils are remarkable. There seems to be virtually no limit to the life of E-T coils.

Made to fit. They slip into grooves without abuse. Naturally they last longer.

E-T coils are ideal for replacement. Try them on your next job. *Order some for trial.*

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COLUMBIA

Railway and Utility Supplies

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Machine and Sheet Metal Work

Armature and Field Coils.

The Columbia Machine Works *and M. I. Co.*
265 Chestnut St., corner Atlantic Ave., Brooklyn, New York



The "Gay 90's" would be sad days today

Simply because our styles, our fashions, our mode of living and our transportation needs have changed. No longer do "picture-hats" and "peg top" trousers represent the Beau Brummel. Masquerading in public in such attire today would surely lead to trouble.

SO it is with the 19th Century cars and those of later vintage—all long since passé.

L. Schiavone and Bonomo Bros., Inc., are interested in just such cars as you may have. The price is generally right and you will quickly see your valuable tracks freed of unnecessary and unproductive equipment and lessen your losses due to vandalism.

We have been in business for thirty years. We have the experience, the facilities and the men to handle our work effectively and with the least possible trouble to you.

We are in business to help you in your modernization program by simplifying your task of disposing of obsolete equipment.

Hence we invite your inquiries as to what we can do in turning your old or obsolete equipment into cash—be it a dozen cars or a whole system—assuring you at the same time of the full benefits of our services.

We are not Alchemists—
But—
we turn iron and steel into gold and silver.

L. Schiavone & Bonomo Bros. Inc.

Jersey City, New Jersey

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Air Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Wks.
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Axles (Front & Rear) Motor Truck & Passenger Car
Timken-Detroit Axle Co.

Axles, Steel
Bethlehem Steel Co.

Axles Trailer & Motor Bus
Timken-Detroit Axle Co.

Babbit Metal
National Bearing Metals Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Wks.
Nat'l Bearing Metals Corp.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Stucki Co., A.

Bells & Buzzers
Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Bender Body Co.
Brill Co., The J. G.

Body Material, Haskelite & Plymetl
Haskelite Mfg. Co.

Bolts, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Bond Testers
Elec. Service Supplies Co.

Bonding Apparatus
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Books
McGraw-Hill Book Co., Inc.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Columbia Machine Wks.
Electric Rlwy. Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Nat'l Rlwy. Appliance Co.
Westinghouse Tr. Brake Co.

Brake Material
American Brake Materials Corp.

Brake Shoes
Bemis Car Truck Co.
Brill Co., The J. G.

Brake Testers
Nat'l. Rlwy. Appliance Co.

Brakes, Brake Systems and Brake Parts
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Westinghouse Tr. Brake Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon
General Electric Co.
Morganite Brush Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co.

Brushholders
Columbia Machine Wks.
General Electric Co.

Bulkheads
Haskelite Mfg. Co.

Bus Lighting
Nat'l Railway Appliance Co.

Buses, Gas, Electric
General Electric Co.

Buses Motor
General Motors Truck Co.

Bushings, Case Hardened and Manganese
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnished
General Electric Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & Mfg.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

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Columbia Machine Wks.
Nat'l Bearing Metals Corp.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works & Standard Steel Works Co.
Wm. Wharton, Jr. & Co.,

Castings, Malleable & Brass
Bemis Car Truck Co.
Columbia Machine Wks.

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Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.

Ceiling, Car
Haskelite Mfg. Co.

Ceilings, Plywood Panels
Haskelite Mfg. Co.

Chairs, Parlor Car
Heywood-Wakefield Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co

Change Trays
Cincinnati Car Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Wks.
Electric Rlwy. Equip. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
Columbia Machine Wks.
Elliott-Thompson Elect. Co.
General Electric Co.
Westinghouse E. & M. Co

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Changers
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutators, Parts
General Electric Co.

Commutator Slotters
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts
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General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Sullivan Machinery Co.
Westinghouse Tr. Brake Co.

Compressors, Portable
Sullivan Machinery Co.

Compressors, Gas
Sullivan Machinery Co.

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Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Wks.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.

Controlling Systems
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Anaconda Copper Mining Co.

Copper Wire Instruments Measuring, Testing and Recording
American Brass Co.
American Steel & Wire Co.
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Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., J. A.

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Elec. Service Supplies Co.

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American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols Lintern Co.

Cranes, Hoist and Lift
Electric Service Sup. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog and Switch
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Crossing Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Crossings
Wm. Wharton Jr. & Co.,
Ramapo Ajax Corp.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Track Work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Dealer's Machinery & Second Hand Equipment
Schiavone, L. & Bonomo Bros., Inc.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Wks.
Electric Service Supplies Co.

Detective Service
Wish-Service, P. Edward

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Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.,

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Cincinnati Car Co.
Hale-Kilburn Co.

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National Pneumatic Co.

Drills, Rock
Sullivan Machinery Co.

Drills, Track
Elec. Service Supplies Co.
Ohio Brass Co.

Drum Truing Lathes
Nat'l Railway Appliance Co.

Dryers, Sand
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Wks.
Electric Service Supplies
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Railway Trackwork Co.

Electrical Wires and Cables
Roebling's Sons Co., John

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

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Beeler, John A.
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Byllesby Co., H. M.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.

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Fare Registers
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Johnson Fare Box Co.
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Brill Co., The J. G.
Cincinnati Car Co.
Star Brass Works

Fibre and Fibre Tubing
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General Electric Co.

Floor, Sub
Haskelite Mfg. Co.

Floors
Haskelite Mfg. Co.

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Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Columbia Machine Works
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co

Funnel Castings
Wm. Wharton, Jr. & Co

Continued on page 42



The Right Retriever

There is a special type of EARLL Trolley Catcher or Retriever for every type of service. Our business is making Retrievers and Catchers—nothing else. We have specialized in this particular field for your benefit. Consult us.

C. I. EARLL - - York, Pa.

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M-J Armature Babbitt



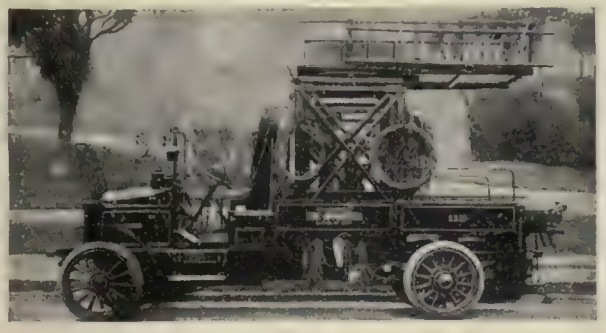


No less than twenty-five different grades of Babbitt have been successfully perfected in the More-Jones line, designed for various services and at varying prices. "Armature" for electric railways is the recognized standard. *Let us quote you.*

National Bearing Metals Corporation

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Jersey City, N. J.
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Portsmouth, Va.
Pittsburgh, Pa.
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"MORE-JONES QUALITY PRODUCTS"



TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER

This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

Swift Service With Safety!

Nachod and U. S. Automatic Block Signals enable your cars to get quickly and safely over the line to bring in the revenue. Schedules are maintained. Patrons are satisfied.

Nachod Headway Recorders are standard with leading roads everywhere to check up car movements. Entirely automatic, they write their own story.

Nachod Highway Crossing Signals make your grade crossings safe.

Equip with Nachod Signals. They increase efficiency, are easy and economical to install, maintain and operate.

N-A-C-H-O-D *Spells Safety*
Write for Catalogs

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General Electric Co.
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General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grinders and Grinding Supplies
Railway Trackwork Co.

Grinders, Portable
Railway Trackwork Co.

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Lorain Steel Co.
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Guard Rails, Tee Rail and Manganese
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Harps, Trolley
Columbia Mach. Wks.& M.I.
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Nichols-Lintern Co.

Heaters, Car (Electric)
Consolidated Car Htg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Wafer
Smith Heater Co., Peter

Heaters, Car, Stove
Smith Heater Co., Peter

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Una Welding & Bonding Co

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Sullivan Machinery Co.

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic
Westinghouse Tr. Br. Co.

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Insulators (See also Line Material)
Electric Railway Equipt. Co.
Elec. Service Supplies Co.
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Hemingray Glass Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings
Haskelite Mfg. Co.

Interurban Cars (See Cars Passenger, Freight Express etc.)

Jacks (See also Cranes, Hoists and Lifts)
Columbia Machine Wks.
Elec Service Supplies Co.

Joints, Rail (See Rail Joints)

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Brill Co., The J. G.
Cincinnati Car Co.

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Elec. Service Sup. Co.
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General Electric Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.
Nichols-Lintern Co.

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Nichols-Lintern Co.

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Nichols-Lintern Co.
Cincinnati Car Co.
Haskelite Mfg. Co.

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Electric Service Supplies

Lightning Protection
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Electric Railway Equipt. Co.
Electric Service Sup. Co.
General Electric Co.
Nat'l. Bearing Metals Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Lorain Steel Co.
Wm. Wharton, Jr. & Co.,

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Electric R'lw'y Equip. Co.
Cincinnati Car Co.
General Electric Co.
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Universal Lubricating Co.

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Amer. Insulating Mach. Co.

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Bemis Car Truck Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

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Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

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Bethlehem Steel Co.
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Manganese Steel Switches, Frogs and Crossings
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
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Westinghouse E. & M. Co.

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Cincinnati Car Co.
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Hale-Kilburn Co.
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Bemis Car Truck Co.
Bethlehem Steel Co.
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Oxy-Acetylene (See Cutting Apparatus)

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Bemis Car Truck Co.

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Okonite-Callender Cable Co Inc.

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Pumps, Air, Lift
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Sullivan Machinery Co.

Punches, Ticket
International Register Co.

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Rail Grinders (See Grinders)

Rail Joints
Rail Joint Co., The

Rail Joints—Welded
Lorain Steel Co.

Rails, Steel
Bethlehem Steel Co.

Rail Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Railway Safety Switches
Consolidated Car Heating Co
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Electric Service Sup. Co.
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Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Sup. Co.
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Elec. Service Supplies Co.

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Westinghouse E. & M. Co.

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Haskelite Mfg. Co.

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Electric Service Sup. Co.
Nichols-Lintern Co.
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Brill Co., The J. G.
Cincinnati Car Co.

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Seats, Car (See also Rattan)
Brill Co., The J. G.
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Brill Co., The J. G.
Cincinnati Car Co.

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Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

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Consolidated Car Heating Co
Electric Service Sup. Co.
National Pneumatic Co.

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Nichols-Lintern Co

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Electric Service Sup. Co.
Nachod & U. S. Signal Co.

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Slack Adjusters (See Brake Adjusters)

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Columbia Machine Wks.
Cincinnati Car Co.
Electric Railway Equip. Co.
Electric Service Supplies Co.
Nat'l. Bearing Metals Corp.
Westinghouse-Nuttall

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Nichols-Lintern Co.

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Columbia Machine Wks.

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Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Westinghouse E. & M. Co

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Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Roeblings Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express, etc.)

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

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Electric Service Sup. Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
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Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

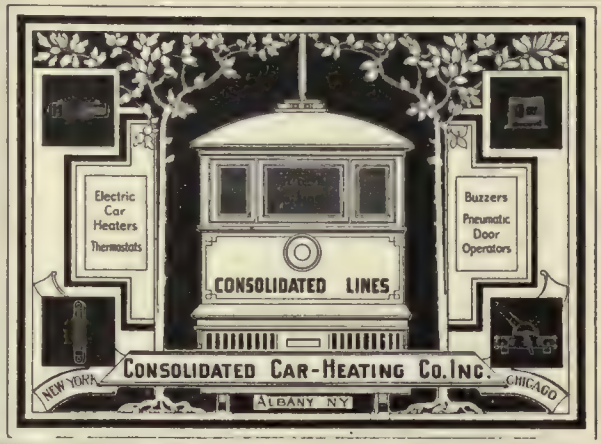
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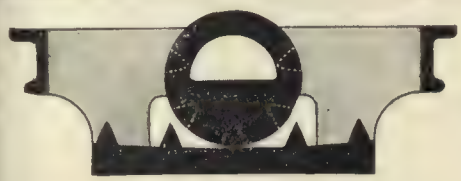
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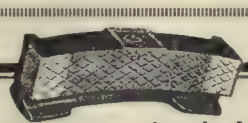
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ALPHABETICAL INDEX TO ADVERTISEMENTS

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— A —

American Brake Materials Corp. 13
American Brake Shoe & Foundry Co. 43
American Brass Co., The 43
American Car Co. Third Cover
American Insulating Mach. Co. 37
Anaconda Copper Mining Co. 43

— B —

Beeler Organization, The 36
Bell Lumber & Pole Co. 37
Bemis Car Truck Co. 32
Bender Body Co., The 23
Bethlehem Steel Co. 31
Brill Co., The J. G. Third Cover
Buchanan & Layng Corporation. 36
Byllesby Eng. & Management Co. 36

— C —

Carey Co., Philip 33
Cities Service Co. 14, 15
Cleveland Fare Box Co., The 43
Collier, Inc., Barron G. 28
Columbia Machine Works & M. I. Co. 38
Commonwealth Steel Co. 35
Consolidated Car Heating Co. 43

— D —

Dayton Mechanical Tie, Co., Insert 11, 12
De Vilbiss Co., The 39
Differential Steel Car Co., The 37

— E —

Earll, C. I. 41
Electric Railway Equipment Co. 30
Electric Service Supplies Co. 7
Elliott-Thompson Electric Co. 38

— F —

Faile & Co., E. H. 36
Ford, Bacon & Davis, Inc. 36
"For Sale" Ads. 38, 39

— G —

General Electric Co. 20
General Motors Truck Co. 16, 17
Goodyear Tire & Rubber Co. 5

— H —

Hale & Kilburn Co. 37
Haskelite Mfg. Co. Back Cover
"Help Wanted" Ads 38, 39
Hemingray Glass Co. 34
Hemphill & Wells 36
Heywood-Wakefield Co. 25
Holst, Englehardt W. 36

— I —

International Register Co. 37
International Steel Tie Co., Front Cover

— J —

Jackson, Walter 36
Johnson Fare Box Co. 37

— K —

Kelker, DeLeuw & Co. 36
Kuhlman Car Co. Third Cover

— L —

Lorain Steel Co., The 35

— M —

McArdell Co., J. R. 41
McClellan & Junkersfeld 36
McGraw-Hill Book Co., Inc. 34
Morganite Brush Co., Inc. 34

— N —

Nachod and United States Signal Co., Inc. 41
National Bearing Metals Corp. 41
National Brake Co., Inc. 21
National Cash Register Co. 27
National Pneumatic Co. 19
National Railway Appliance Co. 37
Nichols-Lintern Co., The 43

— O —

Ohio Brass Co. 8, 9
Okonite-Callender Cable Co., Inc., The 37
Okonite Co., The 37

— P —

Perey Mfg. Co., Inc. 43
Positions Wanted and Vacant. 38, 39

— R —

Rail Joint Co., The 43
Railway Track-work Co. 6
Railway Utility Co. 43
Ramapo-Ajax Co. 43
Richey, Albert S. 36
Roebling's Sons Co., John 43

— S —

Sanderson & Porter 36
Searchlight Section 38, 39
Smith Heater Co., Peter 43
Standard Oil Co. (Indiana) 24
Standard Steel Works Co. 18
Star Brass Works 43
Stevens & Wood, Inc. 36
Stone & Webster 36
Stucki Co., A. 43
Sullivan Machinery Co. 30

— T —

Timken-Detroit Axle Co. 26

— U —

Una Welding & Bonding Co. 43
Universal Lubricating Co. 32

— W —

"Want" Ads 38, 39
Wason Mfg. Co. Third Cover
Westinghouse Electric & Mfg. Co. Second Cover
Westinghouse (Nuttall Works) 4
Westinghouse Traction Brake Co. 10
Wharton, Jr. & Co., Wm. 37
"What and Where to Buy" 40, 42, 44
White Engineering Corp., J. G. 36
Wish Service, The P. Edw. 36

SEARCHLIGHT SECTION

Classified Advertising

Classification — Page

BUSINESS OPP. 38
EMPLOYMENT 38
USED AND SURPLUS EQUIPMENT 38
Schiavone, L. & Bonomo Bros., Inc. 39

WHAT AND WHERE TO BUY—Continued from page 42

Thermostats
Consolidated Car Heating Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Electric Service Sup. Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
American Bridge Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles Ties, Posts, etc.)

Tires
Goodyear Tire & R. Co.

Tokens
Johnson Fare Box Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

Tool Steel
Bethlehem Steel Co.
Carnegie Steel Co.

Tools, Track, Line & Miscellaneous
Columbia Machine Wks.
Electric Service Sup. Co.
Railway Trackwork Co.

Torches, Acetylene (See Cutting Apparatus)

Tower Wagons & Auto Trucks
McArdell Co. J. R.

Towers and Transmission Structures
Westinghouse E & M Co

Track Expansion Joints
Wm. Wharton, Jr & Co.

Track Grinders
Railway Trackwork Co.
Ramapo Ajax Corp.
Una Welding & Bonding Co.

Track, Special Work
Bethlehem Steel Co.
Columbia Machine Wks.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Trackless Trolley Cars
Brill Co., The J. G.

Transfers (See Tickets)

Transformers
General Electric Co
Westinghouse E. & M. Co.

Treads, Safety Stair, Car Step
Cincinnati Car Co.

Tree, Wire
Okonite Co.
Okonite-Callender Cable Co.

Trolley Bases
Nat'l Bearing Metals Corp.
Ohio Brass Co.
Westinghouse-Nuttall

Trolley Bases, Retrieving
Ohio Brass Co.
Westinghouse-Nuttall

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Trolley Material (Overhead)
Electric Service Sup. Co
General Electric Co

Nat'l Bearing Metals Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

Trolley Wheel Bushings
Nat'l Bearing Metals Corp.
Star Brass Works

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
American Brass Co.
American Steel Foundries
Anaconda Copper Min. Co.
Roeblings Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Commonwealth Steel Co.

Truss Planks
Haskelite Mfg. Co.

Turbine, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Electric Service Sup. Co.
Perey Mfg. Co., Inc.

Turntables
Electric Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Ventilators
National Ry. Appliance Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
Nichols-Lintern Co.
Railway Utility Co.

Vestibule Linings
Haskelite Mfg. Co.

Welded Rail Joints
Lorain Steel Co., The
Railway Trackwork Co.
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Welders, Portable Electric
General Electric Co.
Ohio Brass Co.
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General Electric Co.
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Welding Wire and Rods
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Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car Steel & Steel Tire
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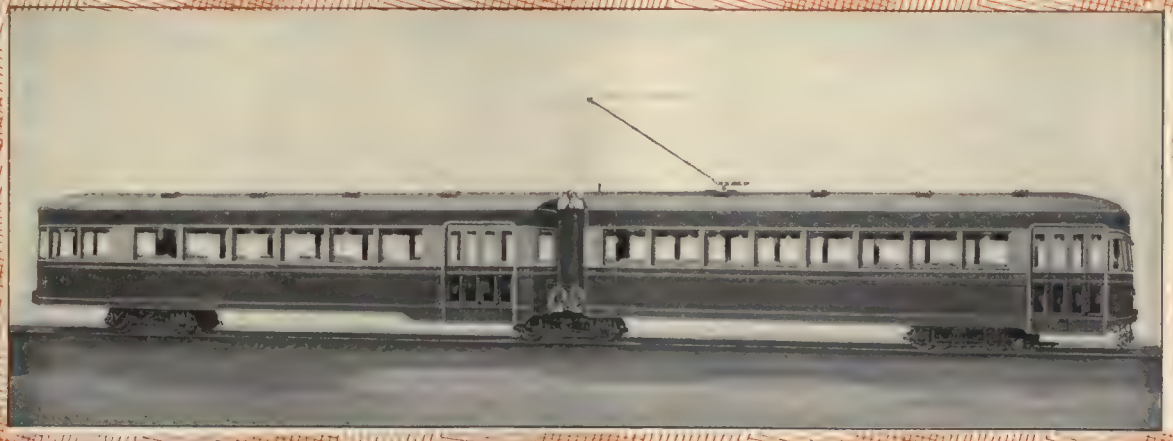
Wheels, Trolley
Columbia Machine Wks.
Electric Rlwy Equip. Co.
Electric Service Supplies Co
Nat'l Bearing Metals Corp.
Ohio Brass Co.
Star Brass Works
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Whistles, Air
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

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As a result "Timken-Equipped" is accepted as a sign of superiority.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

1888

Progress in TRANSPORTATION in West Virginia



1898



1902



1902



1903



1904



1923



The Electric Railway Industry will be interested in the progress made since 1888 by the Monongahela West Penn Public Service Company in constantly operating the best available types of street cars.

As a result, citizens of Parkersburg, West Virginia, patronize their excellent street car service and voice its praises everywhere.

The latest model, as illustrated, embodies every known device for speed, comfort and safety. It is equipped with Westinghouse high speed 300-volt motors and W-N Drive.

Westinghouse Electric & Mfg. Company
East Pittsburgh Pennsylvania

1929



Westinghouse

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MEMBER AERA 1929

Electric Railway Journal

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1929

Advertising Index—Alphabetical, 38; Classified, 34, 36, 38; Searchlight, 33

Vol. 73, No. 8 *Pages 309-346*

February 23, 1929

In This Issue

Editorials 309

The New Civic Malady: Creeping Sickness—Louisville Public Will Profit More Than Company—Big Business Becoming Interested in Bus Operation—Cars That Increase Subway Capacity—Adaptability the Price of Survival—A Short Life and a Merry One!—Agitation for Direct Legislation

Elimination of Parking Proves Successful in Chicago Loop District 312

BY CHARLES GORDON

Increased traffic speed, fewer accidents and better business are the results of Chicago's ordinance which abolished parking in the Loop District.

Philadelphia Subway Cars Designed for Speed, Safety and Convenience 319

Complete details of the construction and operating features of these modern subway cars built by the J. G. Brill Company, are given in this article.

Track Materials Specially Designed for New York City Subways 325

BY ROBERT H. JACOBS

In this article the author describes the design and installation features of trackwork in both the new city subway and the existing dual system.

Special Trackwork Specifications Approved 318

Enlarged Facilities for Instruction at Morgantown 323

Experimental Steam Coach Has Eight-Cylinder Engine 323

Expanding Service on North Shore Line 324

Executives Should Show Greater Interest in Young Employees 328

Midwest Railway Men Discuss Fares and Claims 329

Practical Ideas for the Maintenance Man 330

Helpful Equipment from the Manufacturers 332

News 333

Competitive Bids Sought in Akron—Detroit Will Vote on Subway in April—Court Reverses Order Denying Bus Rights to Chicago Surface Lines—$108,989 Balance in Grand Rapids—Fare and Other Indexes Computed—Loan of Funds in Seattle Approved.

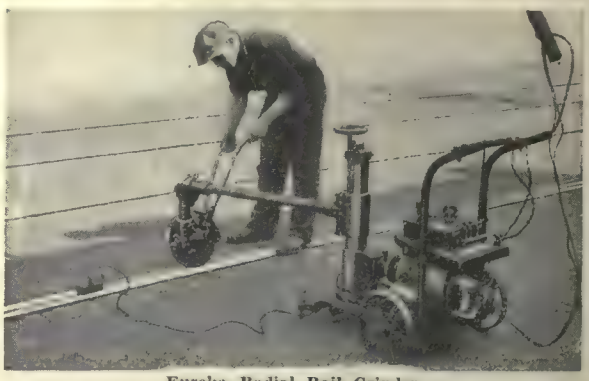
BETTER RAIL, BETTER TRANSPORTATION

Handsome is as handsome does—

No car is any better than the ride it gives.

No street car ride is any better than the track.

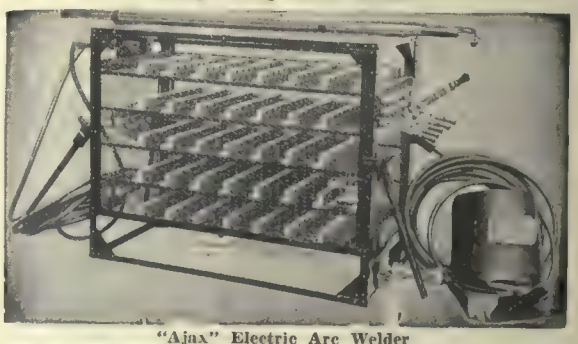
Track improvers—eyes right—see the pictures.



Eureka Radial Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Arc Welder



R. T. W. Curve Oiler

Railway Track-work Co.

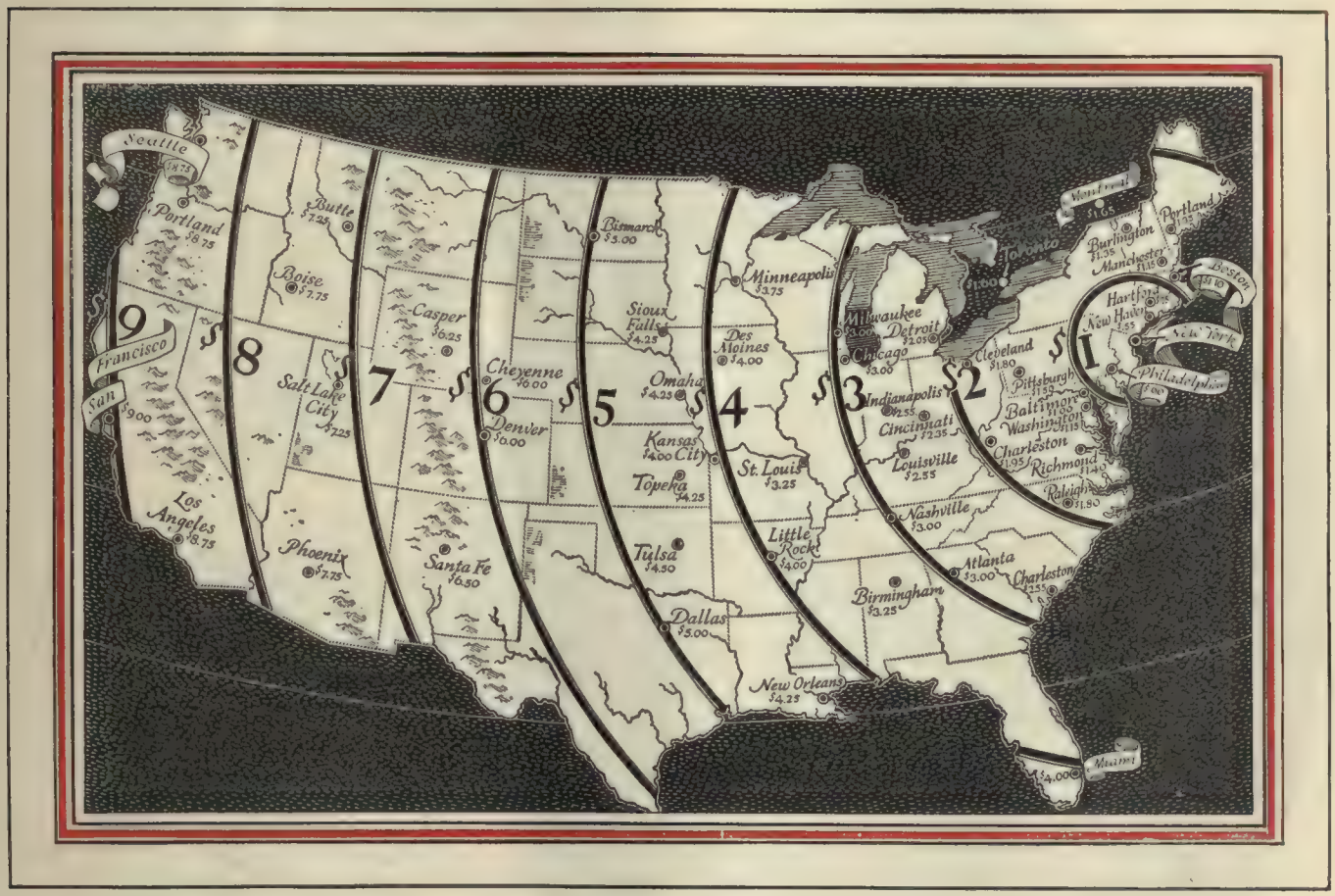
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3176

BETTER RAIL, BETTER TRANSPORTATION

Look how Far your Telephone dollars now Go



When one fish company calls all of its customers everywhere every Monday morning, and conducts all of its business by telephone. . . .

When a single packing house, in one month, receives 1500 calls from its territory ordering meats. . . .

When a flour salesman spends $65 for out of town calls and brings in $500,000 worth of orders in a month. . . .

When this whole magazine might be filled with similar experiences, is it not important that every business man should know how little telephone calls now cost?

There have been rate reductions in 1926, in 1927 and on February 1 of this year. The map shows how far your telephone dollars now go, whether you talk between neighboring cities or half-way across the continent.

What are the problems of your particular organization? Some companies use Sequence Calls to save additional time. Some train special telephone salesmen. Many are now using the Key Town Plan and Credit Plan for their traveling representatives. How could telephone calls save and earn the most for you? A letter or call to your local Bell business office will bring skilled minds to work with yours.

Meantime, what pending out of town transactions could be hastened by telephone?

Bell Telephone Service . . . *Quick* . . . . . *Inexpensive* . . . . . *Universal.*

AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES
BELL SYSTEM

IT'S THE COMPOSITION THAT COUNTS



THERE is a sound foundation for calling the Davis Steel Wheel "One-Wear."

The "One-Wear" quality is based upon a special wheel material—heat-treated scientifically to develop the desired characteristics in each different part.

The high wear resistance, essential to a steel wheel that need never be returned, must be obtained in this way.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Less car time in the shop

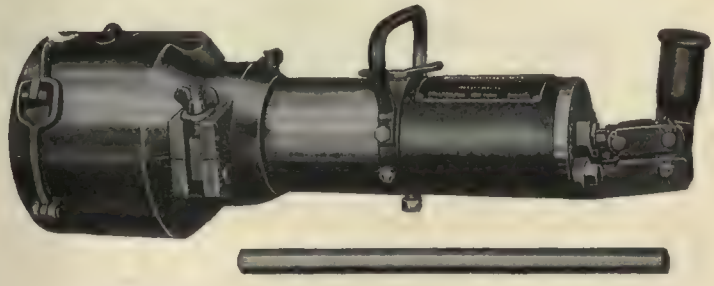
means

more money in your pocket



The new Peerless heavy duty pit jack is designed for work of every character required in the street railway pit. This jack is of the geared wheel and screw type, combining absolute safety with fine adjustment and two speed operation.

The heavy steel frame allows for side adjustment of 10 inches. The top has a minimum raise to 6 feet 3 inches from the floor. Cradle top for handling armatures or flat top as desired. Tops are interchangeable. It's a time and money saver!





KEYSTONE sand drier consists of a heavy cast iron heater surrounded by a sheet iron hopper, which rests on a perforated ring. The wet sand is shoveled into the hopper against the heater, and as it dries, runs out through the perforated ring at the bottom. A speedy, satisfactory way to handle clear sand.

THE PEERLESS hydraulic pinion puller is designed for easy and rapid removal of pinions from armature shafts, and, being portable, it can readily be carried by one man to the armature from which the pinion is to be removed. It has ample power to remove pinions of any size used in electric railway service; a few strokes will remove the most obstinate pinion.

These three items of street railway shop equipment are essentials in the well-equipped shop. They speed up the necessary shop work and thus shorten the time the rolling stock must spend in the shop. They pay their way in a few weeks in saved time and increased production.

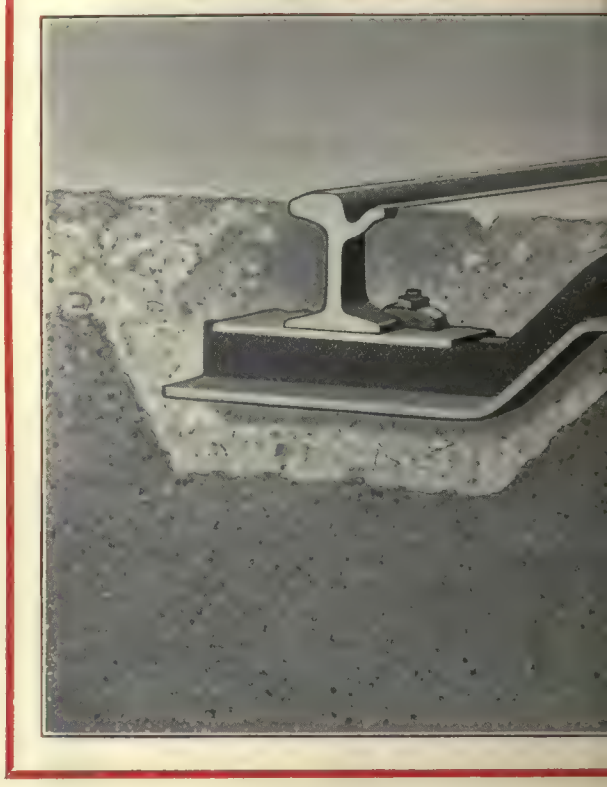
Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

INTERNATIONAL

—an advanced Steel Twin Tie design that makes for a still more efficient use of the minimum amount of concrete in all monolith construction.



THIS tie, to be known as Type X, was developed in conjunction with the engineers of the Capitol Traction Company at Washington, D. C., who are going to install 3000 feet of track, using this tie, as soon as weather permits.

Type X Steel Twin Tie has the plates electric-welded to 3" x 2", 4.1 lb. steel angles. The cross members are bent upward in the form of an elongated arch between the tie plates. This arch strengthens the construction and saves excavation and concrete in a space 7" x 3' wide, through the entire track length. This saving amounts to about

STEEL TWIN

The Base of Modernizatio

RECOMMENDS

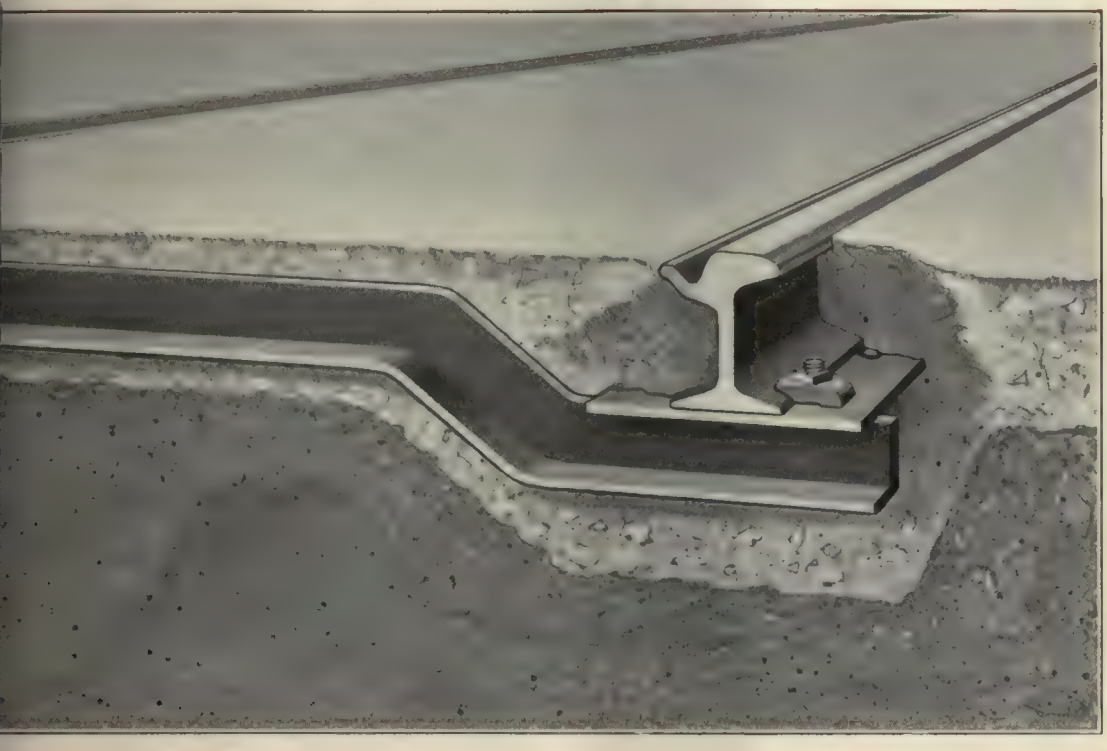


Illustration shows Type X Tie with 7 in. girder rail. This tie is also made for 5 in. and 7 in. rails, canted or vertical.

300 cu. yards of concrete and excavation per mile of single track.

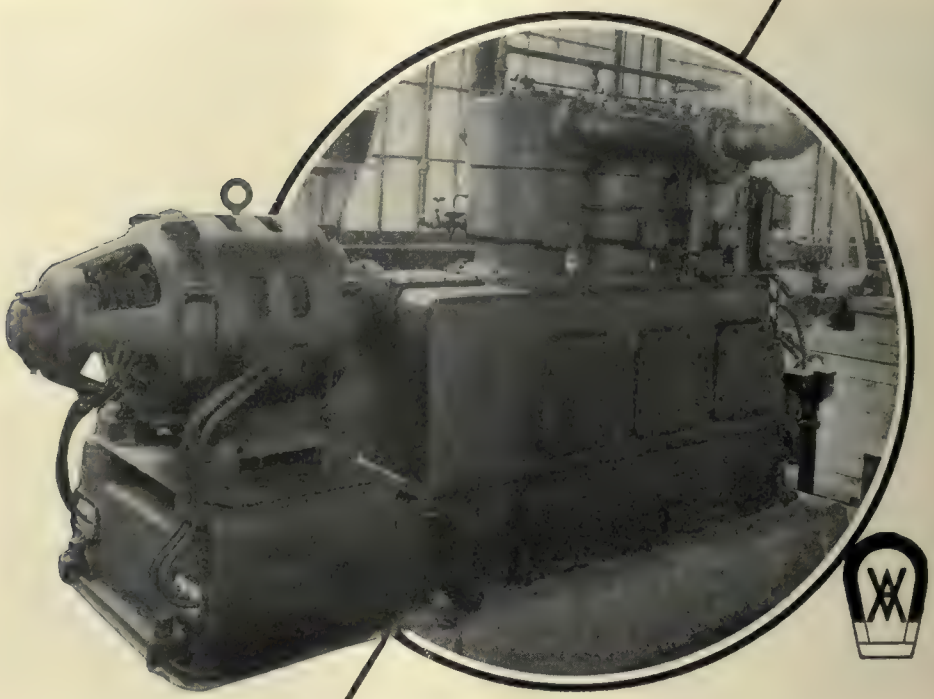
Type X Steel Twin Tie lends itself perfectly to mass production methods of construction. Further information and blue prints will be gladly sent you. May we quote you delivered prices for your 1929 track building program?

The International Steel Tie Co.
Cleveland, Ohio

TIE TRACK

Modernize the Track and the Methods

WESTINGHOUSE—NATIONAL *Air Compressors*



POWER HOUSE

CAR BARN

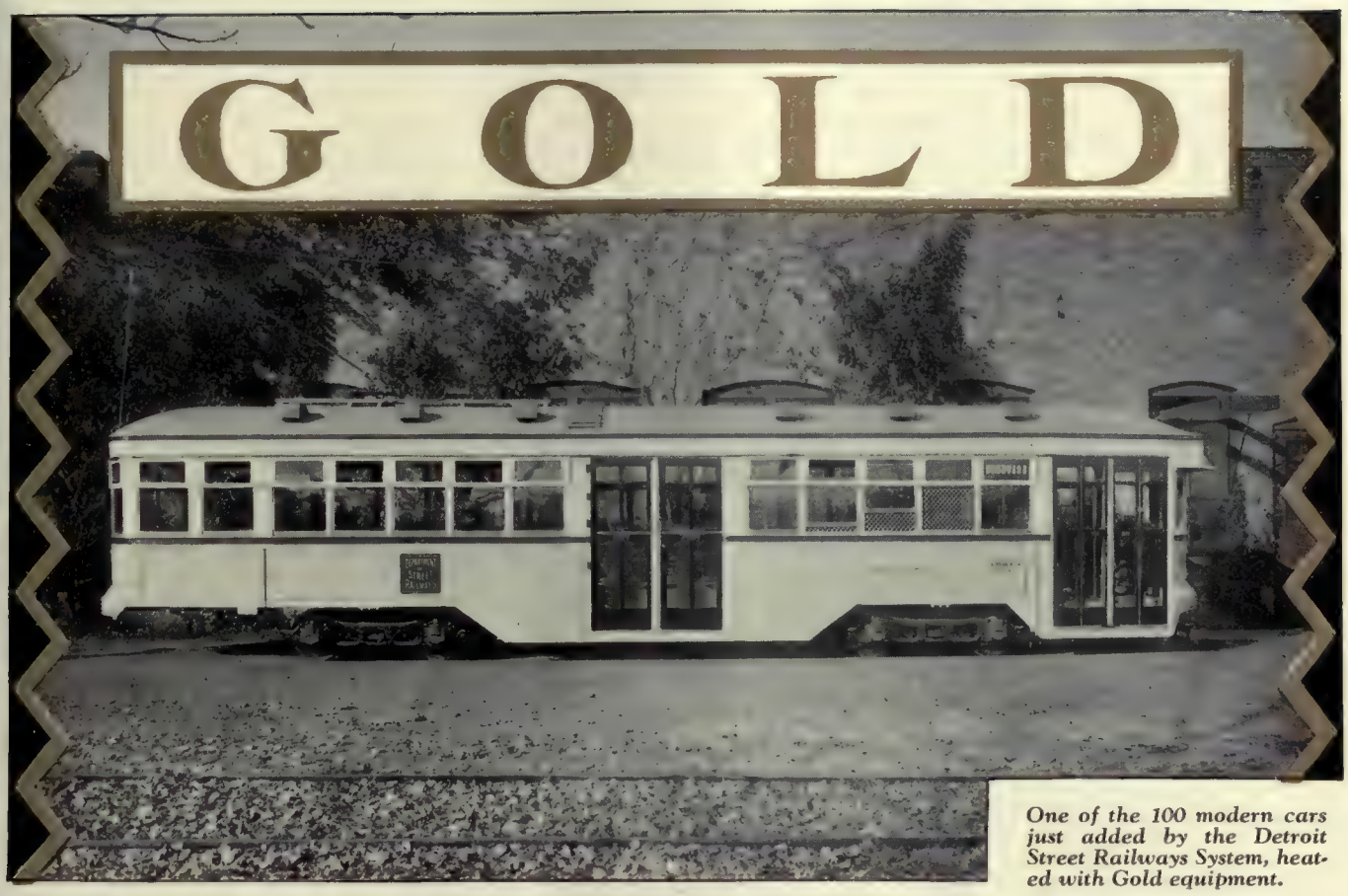
SHOP

Wherever there is a need for compressed air on street railway properties, Westinghouse-National compressors can and are being used. For every requirement—in power house, car barn, shop, or on the right of way—there is a suitable type and size available (ranging from 3 to 700 cu.ft. displacement).

When you think compressed air for any purpose, think Westinghouse-National!

Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.

"QUALITY MACHINES FOR QUALITY SERVICE"



One of the 100 modern cars just added by the Detroit Street Railways System, heated with Gold equipment.

Gold Car Heating Systems represent 50 years of development

THE first scientific idea in car heating for steam railways was introduced by Mr. Edward E. Gold in 1879. Upon that solid foundation of success the Gold Company has added improvement after improvement.

Today, Gold car heating systems reflect this fifty years of study, work and invention in the science of steam and electric railway heating.

In features considered essential to satisfactory performance Gold car heaters are the standard. They are simple in construction, dependable under all conditions, and economical to operate.

Railways equipping with Gold systems have solved the heating problem. The Gold catalog gives complete information, and detailed drawings. Every executive interested in the specification or purchase of heating systems should send for a copy.



GOOD AS GOLD

GOLD CAR HEATING & LIGHTING COMPANY

Bush Terminal Building No. 2

220 36th St., Brooklyn, N. Y.

In Canada: CANADIAN GOLD CAR HEATING & LIGHTING CO., LIMITED, 728 St. James St., Montreal



South Market Street, Youngstown, Ohio, where Union Metal Fluted Steel Poles have brought new beauty to the curb-line.

Meeting the Demand for Strength, Long Life, *and Appearance*

ORNAMENTAL steel poles are rapidly replacing the old, crude, unsightly type. Every year sees more importance attached to street appearance — and to the way poles and other electrical equipment affect this appearance.

In a recent issue of Electric Light and Power, Managing Editor L. S. Leavitt says:

> "The selection of poles which will fulfill the requirements of strength and life, and at the same time *meet the requirements of physical appearance as laid down by public opinion, expressed in civic ordinances or otherwise, is a problem of real importance* and cannot be neglected if the placing of wires underground before economic conditions warrant is to be circumvented."

Union Metal Fluted Steel Poles meet the demands for strength, durability and appearance. That is why they are especially desirable in cities where public opinion is demanding underground lines. They may be used for transmission and distribution lines, for supporting lighting units, trolley span wires and traffic signals—in fact, wherever poles of any type are needed. In each instance their beauty and attractiveness will immediately dispel the objections to overhead construction.

THE UNION METAL MANUFACTURING CO.
General Offices and Factory, Canton, Ohio
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Distributors:
Graybar Electric Company, Incorporated G-E Merchandise Distributors Association
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UNION METAL
DISTRIBUTION AND TRANSMISSION POLES

Ask about the other fellow

When the National Pneumatic Treadle was new, some operators thought that it might inconvenience passengers or slow up service. Today, however, operators in eighty-eight cities *know* that automatic treadle operation for their exit doors is practical from every standpoint. If you, in turn, have any doubts upon the subject, ask us for list of treadle installations.

NP

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

EFFICIENT



50 Years of experience have enabled *International* to build an efficient organization which can produce highest quality poles at the lowest possible cost.

Every detail is supervised with the care characteristic of conscientious timbermen, inspectors, engineers and chemists, who insist on those "extra little things" which make the "big difference."

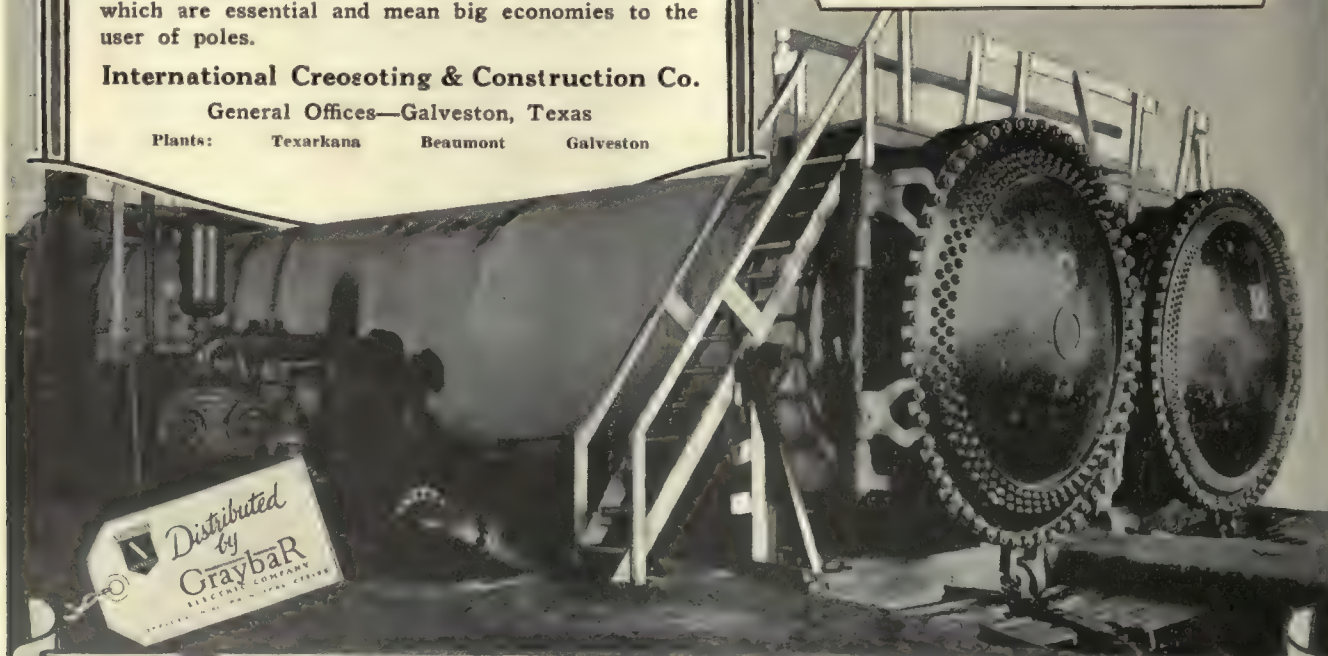
Modern labor saving equipment—large treating and seasoning capacity and efficient framing crews make possible the efficient handling of large quantities—thereby reducing costs and speeding deliveries—all of which are essential and mean big economies to the user of poles.

International Creosoting & Construction Co.

General Offices—Galveston, Texas

Plants: Texarkana Beaumont Galveston

Upper illustration shows a section of the seasoning and framing yard at Texarkana, which is tile drained and kept free from vegetation. Lower illustration shows two of the largest treating cylinders in the wood preserving industry, located at the Texarkana Plant.



Distributed by Graybar Electric Company

International Creosoted Yellow Pine Poles

Increase Revenue with PASSES

A Few Varieties

NICKEL PASS: Rider drops nickel and shows pass every ride. Advantages are elimination of odd-cent change, a bargain inducement to ride on off-peak hours, and lower initial outlay.

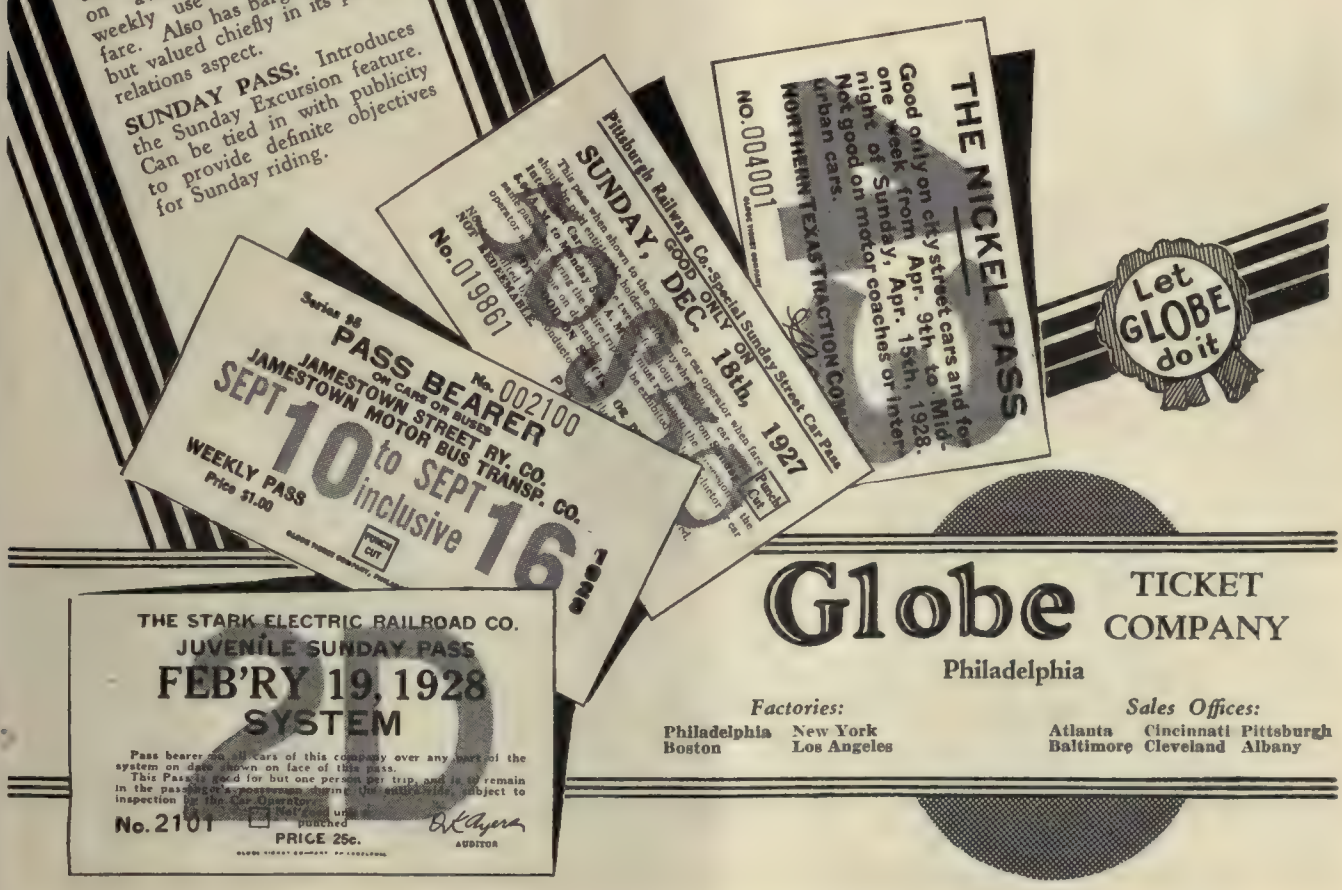
WEEKLY PASS: Flat-rate, unlimited. Selling price scaled on average regular rider's weekly use under prevailing fare. Also has bargain appeal, but valued chiefly in its public relations aspect.

SUNDAY PASS: Introduces the Sunday Excursion feature. Can be tied in with publicity to provide definite objectives for Sunday riding.

BRIEFLY:

1. Increase riding especially at off-peak hours—filling those empty seats at no extra cost.
2. Assure revenue whether pass is used or not—and each pass means money in advance.
3. Speed up schedules by faster loading through reduction in change making. A decided advantage with one-man operation.
4. Reduce auditing—larger units, easily identified.
5. Bring a week's riding to a definite figure which far outclasses the automobile.

GLOBE'S 50 years of experience in every type of fare collection is at your disposal, and will be 50 years hence. Put it to work on your lines now.

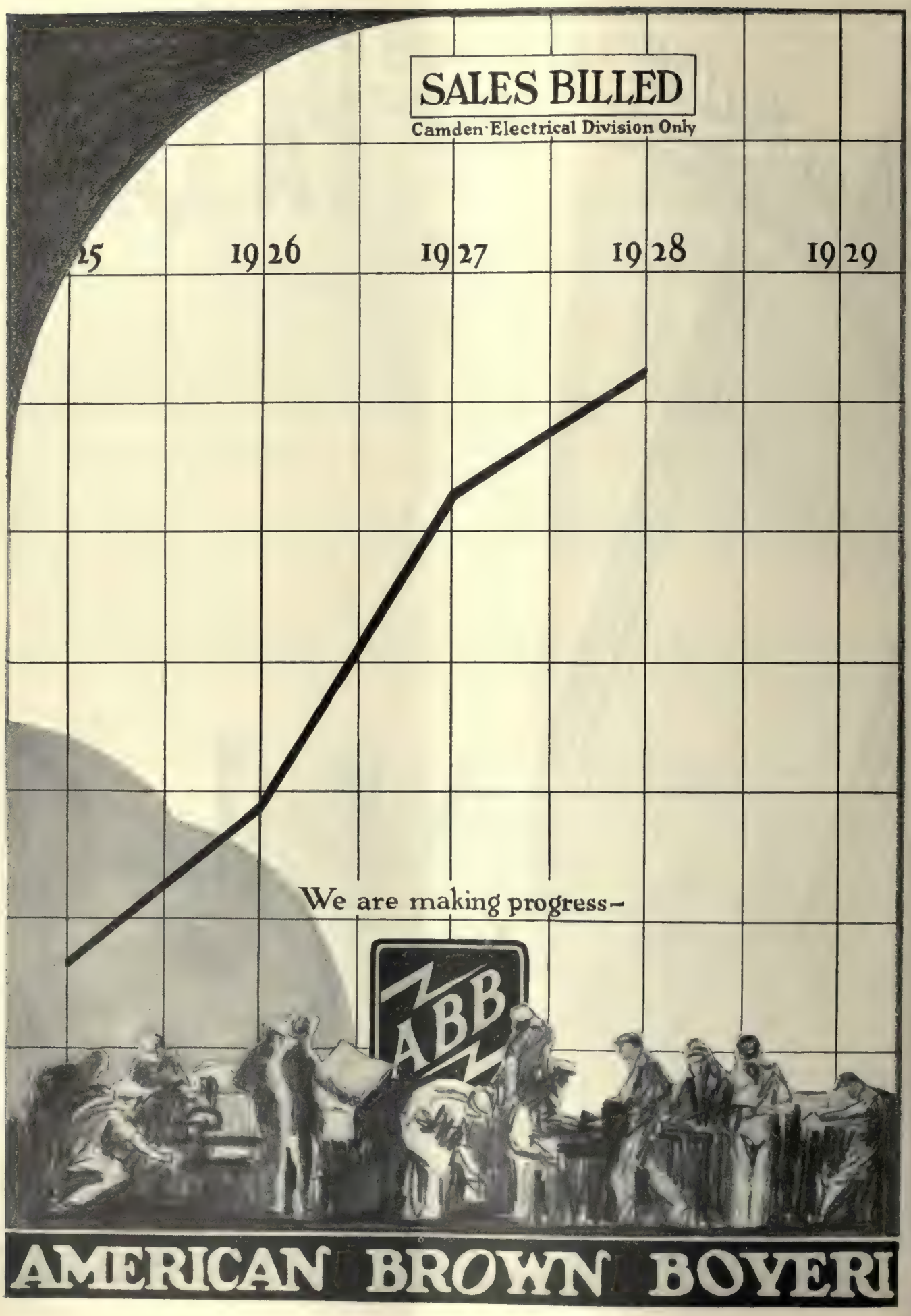


Globe TICKET COMPANY

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SALES BILLED
Camden Electrical Division Only
25
1926
1927
1928
1929
We are making progress–
ABB
AMERICAN BROWN BOVERI



Under Rush-Hour Loads—

How about your wheels?

Every system has its rush-hour peaks—times when passengers expect maximum service—and times when operation is hardest on equipment.

"Standard" Axles, Wheels and Springs are chosen for large numbers of modern cars because they have that reserve service necessary for rush-hour operation.



"FOR EVERY TYPE OF CAR

IN EVERY TYPE OF SERVICE"

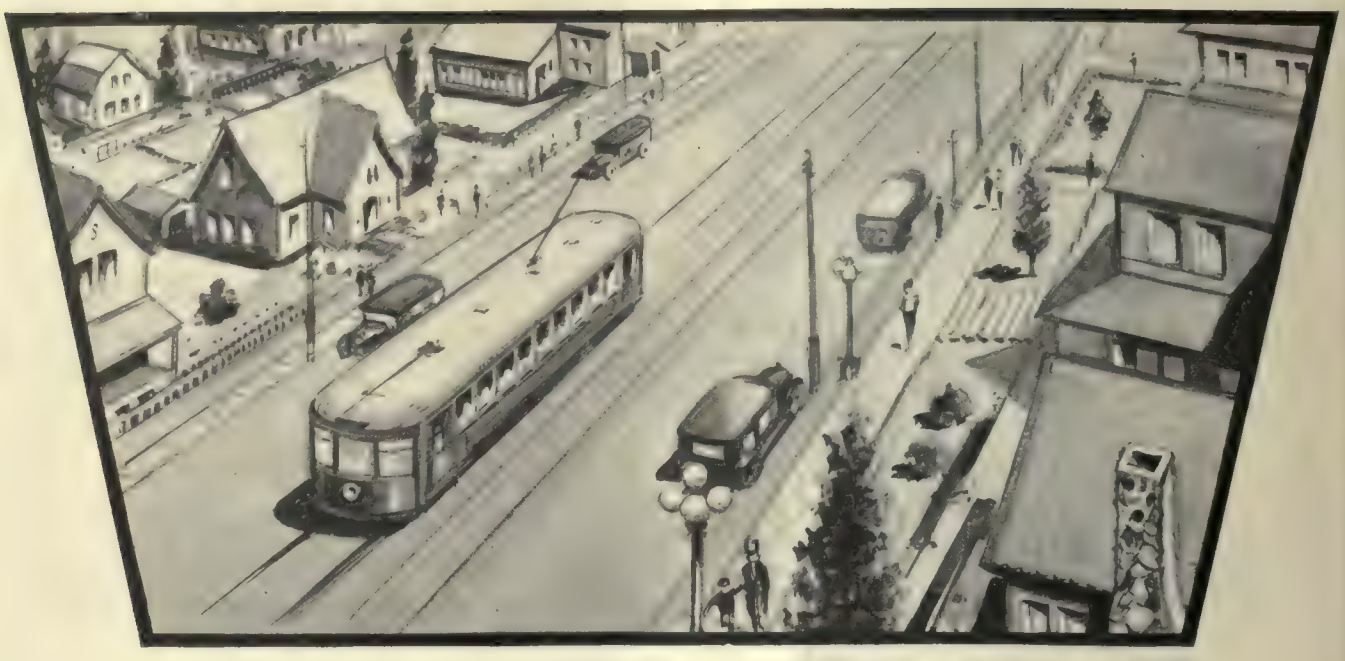
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PHILADELPHIA, PA.

BRANCH OFFICES:

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"and all joints were Thermit welded."

Almost every article you read, on the subject of track construction and maintenance, now contains a reference to Thermit welding. It's just the ordinary thing. The use of Thermit has become standard practice on practically all the railways which have modernized their track methods.



THERMIT

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



allows for shrinkage

A large street railway company reports that it has found G-E Type "A" welding electrode invaluable for the reconditioning of cast-iron gear cases, which sometimes crack under severe service.

Type "A" electrode meets requirements because of the ductility of the deposited metal. Shrinkage, subsequent to welding, has yet to impair the soundness of a weld or crack a gear case, which is a relatively light casting. Wherever cast iron is welded, a certain amount of shrinkage will take place, and welders best guard their interests by using an electrode known to be unaffected by this condition.

For prompt service or additional information as to various types of G-E electrodes, get in touch with the G-E Welding Electrode Distributor near you or write to Section E-502, Merchandise Department, General Electric Company, Bridgeport, Connecticut.



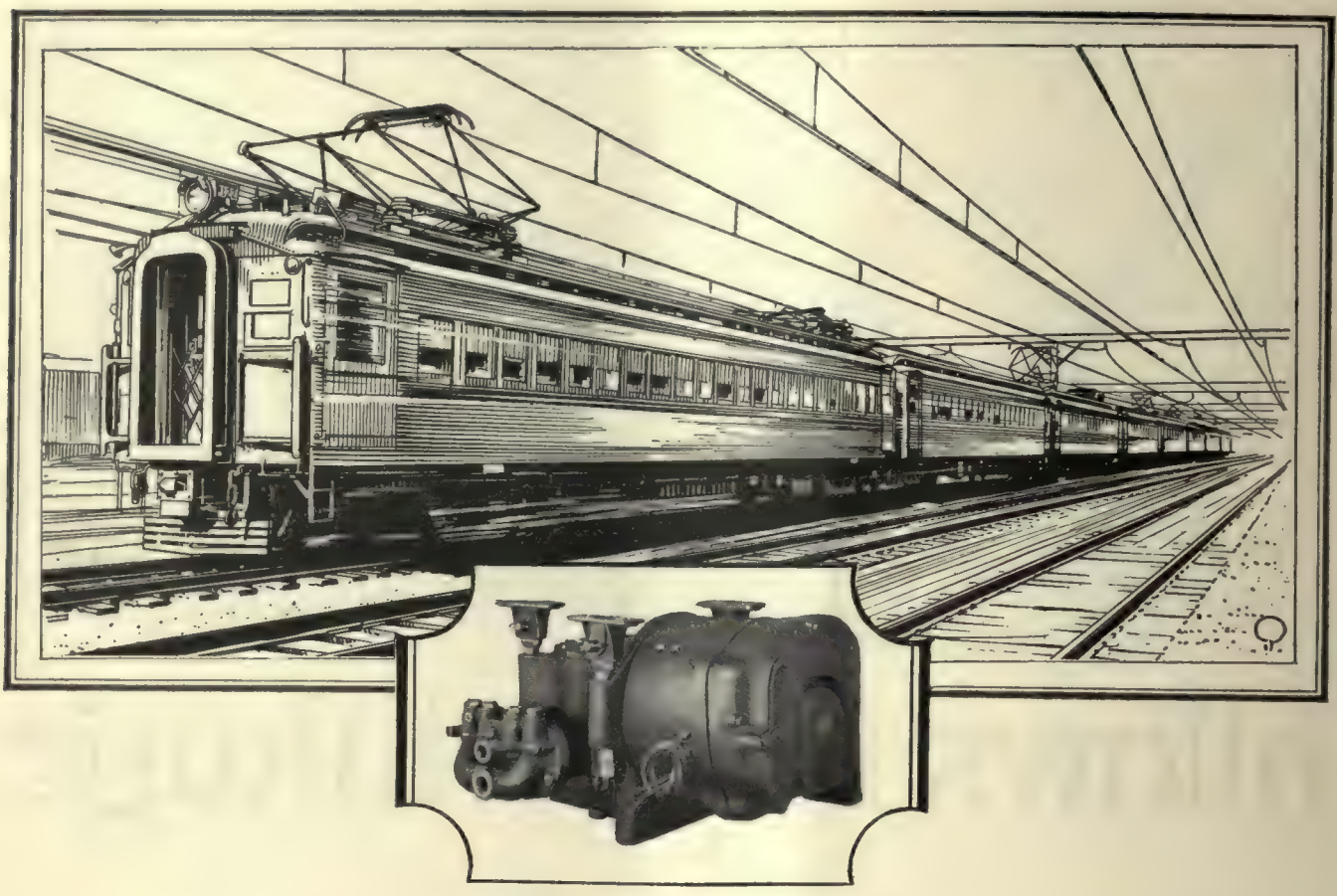
In absolute reliability of operation and over-all efficiency, G-E arc welding sets are unequalled. They are available in all sizes, all types—for either hand or automatic operation—for one or more operators.



550-502

GENERAL ELECTRIC

MERCHANDISE DEPARTMENT, BRIDGEPORT, CONNECTICUT



Illinois Central's Cars have G-E Compressors

The Illinois Central operates 130 of these multiple-unit cars on its recently electrified section. Each of these cars is equipped with a General Electric CP-30 1500-volt compressor and a Type ML air compressor governor.

The Illinois Central is one of the many roads which have learned that G-E compressors deserve their reputation for dependability.

General Electric has been identified with the electric railway industry since its inception. The experience gained in these 40 years is built into every piece of equipment that carries the G-E monogram.

330-49

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
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CHARLES GORDON, *Editor*

LOUIS F. STOLL,
Publishing Director

Volume 73 New York, Saturday, February 23, 1929 *Number 8*

The New Civic Malady—Creeping Sickness

NO MALADY that has affected American cities has been more insidious than the so-called creeping sickness. Cities large and small are its victims, says *Collier's*, in its issue of Feb. 16. While the possible range of human activity awheel has been greatly increased, the actual range has been constantly decreasing.

Readers of the JOURNAL know how true all this is, but it is significant when publications like *Saturday Evening Post, Liberty, Mercury* and *Collier's* begin to give it serious attention. Reiterating that highways have become garages, and that the very density of automobiles is a barrier to travel by that vehicle, *Collier's* reminds its readers that most of this is unnecessary. Streets are closed and traffic drowns in a sea of vehicles because of neglect. Motor cars won't drive themselves and the problem of congestion won't solve itself.

To the automobile users among its readers *Collier's* says that if they want to get the full value out of their automobile they will have to insist upon sensible traffic regulations. The same commentator says that each city and village presents a separate problem due to topography and the habits of the people, but it reminds its readers that while details of sensible regulations vary, the fundamentals are the same. Merchants are scored who protest against any remedy that seems to affect their immediate advantage.

But *Collier's* does more than fulminate. Like other commentators who have given the matter serious thought, that publication reiterates that the important thing is to get the idea of the general welfare uppermost, and to insist upon traffic regulations that will serve the interests of the entire community. Its appeal is personal, for it says that "given that generous and courageous spirit and your city, wherever it is, can soon find the expert wisdom sufficient to open its highways to public travel." There is a deadly thrust in the wording "wisdom sufficient to open its highways to public travel." It is a challenge to everybody everywhere to lend his aid in putting public interest above that of special groups, to the end of relieving the new civic malady, "the creeping sickness."

Louisville Public Will Profit More Than Company

FEW railway rate appeals have been stated more succintly than that of the Louisville Railway. The company not only makes plain just what it deems to be desirable in the new rate structure, but at the same time it conveys to the people of Louisville a lesson in elementary economics. It is another case of the starved horse being unable to pull a full load. The disposition to do so may be there, but the strength is lacking owing to denial of the proper sustenance. The company hopes under the revised rates to achieve an increase in net earnings of approximately $600,000, giving a net yield under 5.4 per cent of the rate base value. It is not insisting upon the full exercise of its right to an 8 per cent return.

The company wants to put new money into cars and other improvements. To do this it must find a way to refund $6,000,000 of mortgages which become due on June 30, 1930. To refund this capital on reasonable terms the company must show net earnings at least equal to twice the interest on all of its fixed indebtedness. Men of affairs know what all this means. They know that a sustained record of earnings is absolutely essential to borrowing on terms that are not onerous. And onerous terms to a utility penalize not only the utility but the public which patronizes the utility. These are things given little heed by the public.

The Louisville Railway is not asking its public to be generous. In a strict sense, it is not even insisting that it be fair. Second in importance, of course, to the financing is the proposed rate structure. In suggesting a cash fare of 10 cents, the company is seeking a rate which has come generally to be accepted as the fee that the occasional rider should pay. The problem after that is to fix a so-called bulk rate tariff that shall keep the service attractive to the public and return the largest possible income. That is not so easy. The company recognizes this by frankly saying that we "will experiment with reduced-rate tickets." Rate making, like other pricing, is not only a science but an art. The whole plan at Louisville is designed to afford the public more service rather than less. Approval of the application for an increased fare will be in the public interest. Denial will be against public interest even though the latter action may be popular with uninformed and unthinking people.

Big Business Becoming Interested in Bus Operation

DURING the past few months there have been several indications of a tendency by steam railroads and a number of holding companies prominently identified with electric railway operations to enter the field of interstate bus operation on a large scale. This has been characterized by a number of developments of more than ordinary significance. Of the steam railroads, the Missouri Pacific and the St. Louis Southwestern have recently launched extensive programs of motor bus operation. The Pennsylvania Railroad is said to have acquired a substantial interest in the long-distance lines operated by a subsidiary of the Philadelphia Rapid Transit, and is even rumored to have an interest in a large transcontinental bus holding organization, while the Reading company is seeking to strengthen its position by the acquisition of competing routes. Among the electric railways the Kentucky Securities Corporation, controlling the Kentucky Traction & Terminal property, has announced plans for taking over an independent bus company with the view to extending service into several adjoining states. The unification of disconnected, independently operated bus routes into sys-

tems extending from coast to coast has for some time been an established fact, and appears to be but the forerunner of other large scale consolidations.

It is significant to note that the more important of these proposed developments contemplate interstate service, a type of operation which has been looked upon with disfavor in the past due to the lack of that restraint and regulation which is considered essential. As any hope for stability and financial success of interstate operation appears to be predicated upon proper regulation, it is only fair to assume that those responsible for these consolidations and extensions of service are proceeding in the belief that regulation, long withheld, is at last about to assume form. Just when and to what extent this hope will be realized, depending as it does upon Congressional action, is a matter of conjecture. The Parker bill, now before the committee of foreign and domestic commerce, is scheduled for action at an early date. Its passage in acceptable form would undoubtedly strengthen the status of those lines already well established in interstate operation. For the first time since its inception the motor coach industry, as regards the operation of interstate lines, would be in position to attract capital and responsible management on a large scale. Conceivably, the recent announcements may presage developments of an important nature.

Steam railroads, taxicabs, trolleys—all are subject to the same economic laws, and the extent of their prosperity and stability is invariably measured by the extent of their freedom from unregulated competition.

Cars That Increase Subway Capacity

BESIDES many features embodied in recent rapid transit rolling stock, a number of distinctly novel developments are found in the design of the cars for the new Philadelphia subway. When the Broad Street subway was designed the width was made great enough so that cars with a width slightly greater than 10 ft. would have clearance. While car capacities ordinarily are figured in terms of length, the gain in going from the ordinary width of approximately 8 ft. 6 in. to 10 ft. is approximately 20 per cent in available inside floor area. In other words, the four-track subway that is being constructed will have a capacity almost as great as a five-track subway with ordinary cars. To obtain such an addition to capacity involved only a minor increase in cost of the subway, principally for excavation and concrete work.

In their dimensions the cars follow closely those of the New York Rapid Transit Corporation, the Boston Elevated Railway and the New York, Westchester & Boston. The features that have been tried and proved out on these cars have been incorporated in the Philadelphia design, and a number of refinements have been added, as told in an article published elsewhere in this issue. In particular, attention has been paid to the location of the doors and the seats, so that the arrangement of the several sections is similar and the distances to the doors are alike. This will make for rapid loading and unloading. The seating plan gives a large open space adjacent to each door, thus preventing crowding. While there are transverse seats they are so arranged as to produce a minimum interference with movements of standing passengers.

Among the innovations is a control station for the conductor or guard in each motorman's compartment. The man in charge of the doors thus does not have to be exposed between two cars, or in the doorway where he is in the direct line of passenger movement, as in some other designs. This arrangement also makes it possible to simplify the door control circuits and provide an auxiliary door control in the hands of the motorman, so that he can hold the doors closed if the train has overrun the station platform.

It is interesting that the single car of 67 ft. 6 in. length was adopted instead of the articulated unit such as used on some of the Brooklyn lines. At present the loading in Philadelphia is comparatively light, and the single units give more flexibility in train make-up. Since the weight, the passenger capacity, and the motor rating are approximately half those of the articulated unit there is comparatively little to choose from the standpoint of system capacity or operating cost.

The acceleration of the trains, 1.9 m.p.h.p.s., is the highest as yet used in rapid transit service. This not only makes higher schedule speeds possible but also makes for greater track capacity, particularly where stops are close together, as in local service.

Adaptability the Price of Survival

ACTING apparently upon the belief that adaptability is the price of survival and that to stand still is to invite retrogression, a committee of the C.E.R.A., after a study covering several years, has recently brought in a report in which it is recommended that all member companies proceed to inaugurate concurrently a freight pick-up and delivery service, local and interline, absorbing the costs where necessary. The recommendation is unequivocal, it has the support of some of the most influential operators in the group, and it is backed by a statement of facts that admits of no argument as to the soundness of its conclusions.

Despite the tremendous industrial development of the region served by these central interurban companies, the committee finds that their volume of freight business is and for several years has been practically at a standstill. The cause is not far to seek. The motor truck, the committee concedes, is getting the business, and will continue to do so unless the trolley lines bring their service more into accord with the requirements of the shippers. How best to accomplish this end the committee packs into the few terse recommendations cited above.

Perhaps no one of the many questions that have arisen in recent years to plague the common carriers, steam railroads and trolley lines alike, has been so much discussed as has this one having to do with freight pick-up and delivery. Every angle from which it has been approached has been beset with difficulties, but nowhere has any clear-cut solution been proposed

Consequently, the recommendation of the committee is one of far reaching significance and one which will challenge the skill and resourcefulness of those upon whom devolves the responsibility of carrying it out.

Modern business has imposed upon common carriers a demand for speed, economy and convenience in the handling of merchandise. The trolley lines have met the first two requirements to an eminently satisfactory degree but it is only fair to admit that in the third particular, involving pick-up at the door of the shipper and delivery at the door of the consignee, the motor truck is superior.

To overcome this handicap the committee proposes that the trolley companies shall arrange, wherever necessary, to complete the entire transaction by means of agencies under their own control.

But if the problem in its general aspects is a simple one, in its particulars it is most complex. Having decided to provide a supplementary service as called for in the committee's recommendation, the companies must make further decision as to where and to what extent they will perform the service themselves or delegate it to other agencies. The question of the proper charge for this service, as well as its allocation, must be worked out and approved by the local regulatory authorities. Concessions must be made to the shipper who prefers to make his own delivery to the carrier's warehouse, and to the merchant who is prepared to handle his own pick-ups from the warehouse platform. These and other problems that will arise have proven vexatious in the past; they will be no less so in the future. But they are capable of solution if approached with a united front and backed by the proper determination and spirit.

A Short Life and a Merry One!

SIGNIFICANT as representing the changing viewpoint of railway men was the recent meeting of the Electric Railway Association of Equipment Men, Southern Properties. Much of the time of the meeting was devoted to a discussion of the methods of bus maintenance, the members considering various elements of the problem at length. In particular, complete rebuilding of buses was considered. The opinion brought out was that while complete rebuilding is desirable if the bus is worth it, a long life should not be sought, on the ground that obsolescence is an important factor to be considered and new equipment is needed to hold riders.

When equipment men, who ordinarily have to make their vehicles presentable for as many years as they can, will take this viewpoint it is an indication that a radical change is taking place from the old attitude of transportation men. Maintenance men in particular have been long schooled in economy. Their object in life is to get as much as possible out of every dollar they spend, so that they would be reluctant to advocate retirement of vehicles unless they believed it to be in the best interests of economy. The successful records made on their properties by the members of this particular association show that they understand thoroughly the principles of getting full value for every dollar invested.

The remarks regarding the life of the bus are applicable as well to the street car, as will be seen from the work of these same men. In no section of the country has there been greater attention to the modernization of rolling stock. That is one of the principal reasons why the properties in the Southern territory have been able to keep down maintenance costs to a low level. To mention the roads in the South where new equipment has been of benefit would be practically to recite the companies which belong to this association. Many of these properties have been strong contenders for the Charles A. Coffin Award. Two of them have won it in the face of strong competition. The attitude toward equipment life expressed by the Southern equipment men is based upon experience, not theory. They recognize not only an economic limit in the life of passenger-carrying rolling stock, but a merchandising limit as well.

Agitation for Direct Legislation

VERY timely indeed was the paper "Regulation Must Be Related to Economic Law," presented before the Central Electric Railway Association by R. N. Van Doren and published in ELECTRIC RAILWAY JOURNAL of Feb. 2, 1929. Governors are memorializing their legislatures with proposals affecting the regulation of the utilities and bills are being presented in a flood. These measures range from the one advocated in New York for an investigation of utility regulation under the terms of the Moreland act to the three bills in Wisconsin intended among other things to repeal the indeterminate permit law and revoke the statute pertaining to the issuance of certificates of convenience and necessity.

Led by the New York *World*, the malcontents range in the degree of their vehemence from the outpourings of that champion of the public to the plea of the Dayton *News*, to the effect that there is some reason for thinking that regulation of public utilities by public service commissions is inherently doomed to failure. These, of course, are among the views of the extremists. But all is not so bad among the newspapers and the governors. Here and there a commentator appears to have retained some sense of proportion and not to have lost sight entirely of the facts which Mr. Van Doren emphasized in his paper. Thus, almost like a voice in the wilderness, the Governor of Illinois in his inaugural address reminded his hearers that while the purpose of public utility regulation is to provide ample protection for the public from the imposition of exorbitant rates or insufficient or unsatisfactory service, this purpose is not served by hampering development of utility companies and by preventing their earning a fair return on their investment.

Mr. Van Doren and others are cognizant of the fact that there are defects in commission regulation, particularly railroad regulation, but there is no question that with all its shortcomings regulation is a decided improvement over the former plan of direct action by legislatures. It was out of the recognition of the futility of direct legislation that the commission idea grew. As a matter of fact, a *reductio ad absurdum* is implied in the growing tendency to override acts of commissions by direct legislation that would give the commissions arbitrary directions not founded upon well-considered economic study. Mr. Van Doren had in mind more particularly the Interstate Commerce Commission when he reminded his hearers that the commission, being an arm of the legislative body, is, of course, within its legitimate province in prescribing the jurisdiction and organization of its agents, but far more important was his reminder that having once decided upon the policy of scientific regulation, divorced as far as possible from political interference, the development of the regulatory idea should be intrusted to those designated by the state as best qualified for the task. On the whole, the work of the regulatory bodies has been constructive. As they have become more and more judicial in character, the commissions have served to protect the interest of the public while at the same time they have safeguarded the capital invested in the utilities from the legislative tampering of politicians philandering for public popularity. The present onslaught of bills intended to modify the regulatory laws of the state and the nation tend to destroy judicial procedure in dealing with the problems of the utilities, since they would again impose the old objectionable method of direct legislative meddling.

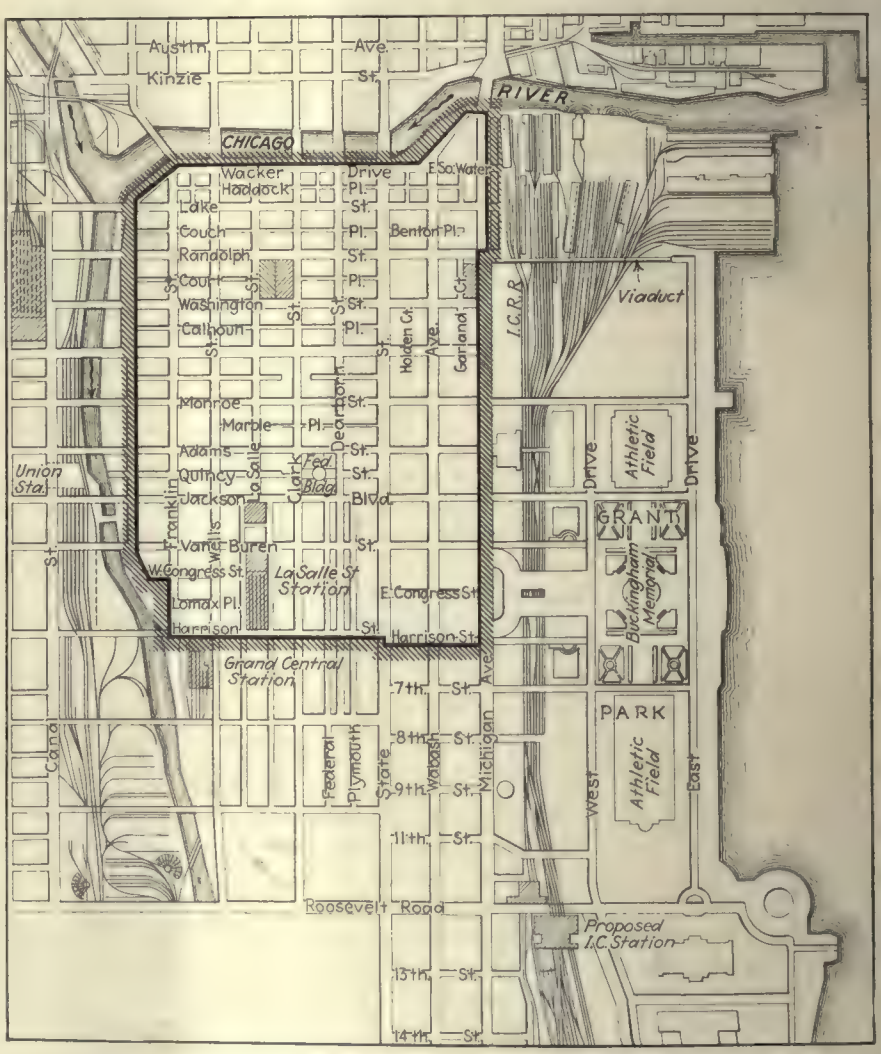
Elimination of Parking

Proves Successful

in Chicago Loop District

Total prohibition of parking in the central business area of the Western metropolis resulted in increasing the speed of all traffic 15 to 40 per cent. More vehicles and people than ever enter the district, but the streets are free of congestion. Accidents have been reduced 10 per cent and, after a year of experience, merchants report business improved

By Charles Gordon



No-parking has been enforced for more than a year in the central business district of Chicago. Within the area indicated by shaded boundary lines parking is banned from 7 a.m. to 6 p.m. on all week days except holidays, and on Saturdays from 7 a.m. to 3 p.m.

ON JAN. 10, 1928, Chicago took a notable step in the relief of congestion in its central business area ordinarily known as the Loop District. On that day a no-parking ordinance, sponsored by the Chicago Association of Commerce and passed by the City Council, took effect. The regulations which were put in force attracted attention throughout the country—and incidentally aroused a considerable protest by a few small merchants and several owners of second-class office buildings who maintained that prohibition of parking from Michigan Avenue on the east to Market Street on the west, and Wacker Drive on the north to Harrison Street on the south would injure their business. This step was taken, however, only after careful study of existing traffic condition, with a view toward determining the justification for parking prohibition as a measure for relieving congestion, accompanied by a careful survey to determine its probable effects upon retail business. After a year of experience the results accomplished are indicated by the effect upon the speed of vehicular movement within the congested business district, by the volume of traffic and the number of people entering the district, by accident statistics, and by the general comparison of business conditions before and after parking prohibition.

Surveys made in May of 1928, after the new regulations had been in effect for approximately five months, show that the total number of vehicles of all classes entering the no-parking area on a typical business day in May, 1928, in comparison with May, 1926, increased from 132,915 to 150,189, or an increase of 13 per cent. Passenger automobile traffic increased 18.33 per cent.



State Street, Chicago, looking north from Monroe, showing traffic conditions as they existed in 1925

This increase is greater than the increase in the registration of motor vehicles during the period from May, 1926, to May, 1928, which was 11.47 per cent. Concurrently, with the increase in motor vehicles entering the Loop District, the running time of street cars in this area was increased from 18 to 33 per cent, and the speed of all traffic moving on the streets was increased from 15 to 40 per cent. Finally, the traffic accidents in the district were 10 per cent lower during the first five months of 1928 than for the corresponding period in 1927, before the adoption of the no-parking regulations.

Little difficulty has been experienced in the enforcement of no-parking, and the number of traffic policemen in the district was not increased except for the first few days following the date the new regulations became effective. According to a report to the Chicago Association of Commerce by J. T. Redmond, chairman of that body's street traffic committee in 1928, the elimina-



Same location as the above, taken in 1928 with parking eliminated. More vehicles per hour were counted passing along State Street than in 1925, but were moving freely instead of being delayed to make congestion. More street cars were also passing in 1928 than in 1925

tion of parking in the central business district, after its first year of trial, has proved generally beneficial and easy of enforcement.

Small Shop Owners Opposed Measure

Apprehension as to the effect of parking restrictions upon retail business led a group representing very minor interests to attempt injunction proceedings against the enforcement of the ordinance. The effort of the street traffic committee of the Chicago Association of Commerce to have the new regulation given a fair 90-day trial finally prevailed, however, with the result that Chicago has now gone more than a year under the new traffic regulation, and most of those who previously opposed no-parking have withdrawn their opposition.

Since the subject of traffic congestion relief is occupying the serious attention of transportation men and public-minded citizens throughout the country, a general review of Chicago's experience is of particular interest after a full year of trial. Under the present regulations parking is prohibited in the central business district on all week days except holidays from 7 o'clock a.m. to 6 o'clock p.m. Passenger vehicles are prohibited from standing for a period of time longer than is necessary for the reasonably expeditious loading or unloading of passengers, with a maximum permissible period of three minutes for this purpose. Commercial vehicles are permitted to stand only for the period of time necessary for the reasonably expeditious loading, unloading, and delivery or pick-up of material, with a maximum permissible period for this purpose of 30 minutes. On Saturdays the restrictions are enforced from 7 o'clock a.m. to 3 o'clock p.m. Exceptions are made for licensed taxicabs when standing at certain designated cab stands. Further execeptions are made for ambulances and emergency vehicles of the city or federal government and the vehicles of public utility companies, while the operator of such vehicles is engaged in the necessary performance of emergency duty.

Parking Ban Followed Other Traffic Relief Measures

The no-parking ordinance in Chicago followed a series of progressive steps taken for the relief of traffic congestion in the central business area. Previous to the passage of this measure a considerable improvement in traffic conditions was made on Sept. 13, 1924, through a major rerouting of street cars entering the Loop area, and the prohibition of left-hand turns for all vehicles within the central district, about a month later, as described in the May 3, 1924, and Nov. 15, 1924, issues of Electric Railway Journal. Another major improvement consisted in the design and installation of a "progressive" signal system throughout the central business district, which became effective on Feb. 8, 1926, and was described in detail in March 27, 1926, issue of Electric Railway Journal. This latter development has been indorsed by leading traffic engineers of the country as the most efficient system of traffic signals yet devised for moving street traffic with a minimum of delay and interference. Subsequent to the design and installation of the system in Chicago it has been adopted in other cities, and progressive signals are rapidly replacing the older form of synchronous signal light control originally applied on Fifth Avenue in New York, and subsequently adopted by many other communities.

The no-parking ordinance in Chicago grew out of a metropolitan street traffic survey made under the direction of the Chicago Association of Commerce by Miller McClintock of the Alfred Russel Erskine Bureau of Street Traffic Research of Harvard University, in 1926. Subsequent to the passage of the ordinance additional studies were made in May of 1928 to determine the effect of the no-parking regulation upon the movement of people and vehicles within the affected business district. Perhaps the most outstanding fact developed by the original traffic survey in 1926 was the almost negligible proportion of patrons of downtown business establishments who depended upon the use of automobiles parked at the curb for transportation in the conduct of their business. Extensive investigations were made of the methods of transportation used by the patrons of various classes of retail establishments through the cooperation of the managements of these stores. The survey covered department stores, office buildings, banks, musical instrument stores, furniture stores, shoe stores, restaurants and book stores. Only 8 per cent of the total patrons arriving at these establishments came by automobile. Of these, only 1.57 per cent utilized curb parking space. A complete summary of the results of this study, as made by the street traffic survey in 1926, is given in Table I on this page.

TABLE I—PATRONS ARRIVING BY VARIOUS MEANS OF TRANSPORTATION, FROM REPORT OF CHICAGO METROPOLITAN STREET TRAFFIC SURVEY

Establishments	Total Patrons	Suburban Trains	Elevated Trains	Street Cars	Motor Coach	Taxicabs	Automobiles — Total	Automobiles — Parking at Curb
Department stores	62,621	12,875 18.5%	23,176 33.3%	19,370 27.8%	8,881 12.7%	709 1.0%	4,610 6.70%	1,013 1.47%
Office building	9,432	2,334 24.7%	3,404 36.0%	1,906 20.2%	505 5.5%	85 0.9%	1,198 12.70%	167 1.77%
Banks	8,421	1,900 22.6%	2,884 34.3%	2,308 27.4%	405 5.3%	79 0.9%	800 9.50%	144 1.71%
Musical instrument stores	2,649	499 18.8%	1,016 38.4%	567 21.4%	315 11.9%	42 1.6%	210 7.90%	61 2.29%
Furniture stores	2,378	449 18.8%	855 36.0%	498 21.0%	291 12.3%	22 0.9%	263 11. 0%	45 1.88%
Shoe stores	1,064	158 14.9%	311 29.2%	169 15.8%	211 19.8%	33 3.1%	182 17. 2%	32 3.02%
Restaurants	2,405	507 21.0%	748 31.1%	343 14.3%	307 12.8%	122 5.1%	378 15.70%	41 1.69%
Book stores	112	20 17.2%	25 21.6%	30 25.8%	20 17.2%	.....	21 18.20%	2 1.74%
Grand total	96,082	18,742 19.5%	32,419 33.8%	25,191 26.2%	10,980 11.4%	1,092 1.1%	7,662 8.00%	1,505 1.57%

Survey Figures Predicted Success

The favorable results that have followed the elimination of parking were anticipated before the ordinance became effective, from the surveys which had been conducted to determine the importance of the part played by parked cars in the transportation of people into the Loop for the conduct of business. The very fact that the surveys conducted by the merchants themselves, among more than 96,000 customers of their own establishments, had shown that only 1.57 per cent of their patrons had come by automobiles that used curb parking space, indicated conclusively that prohibition of parking would have little effect upon business in the district and would be far offset by the results to be expected from the reduction in congestion resulting from the elimination of vehicle storage in the streets. That the parking privilege in congested areas is a practice which has grown up by custom until its value as a public convenience, and as a factor in the conduct of business, is far outweighed by

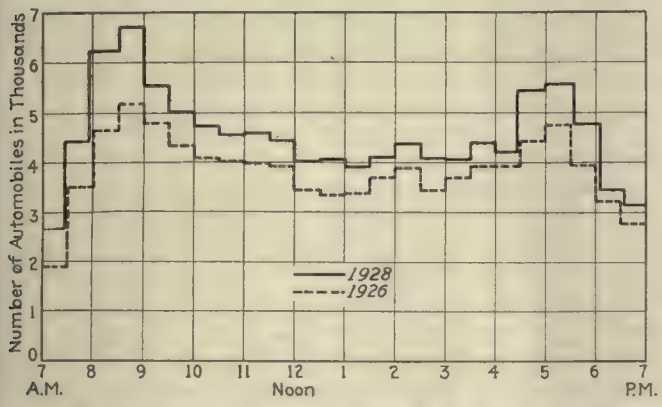


Chart 1—Record by half-hour periods, of passenger automobiles entering the central business district of Chicago on a typical business day in May, 1926, when parking was permitted, and in May, 1928, after parking had been prohibited

its harmful effects in slowing down traffic movement and increasing congestion, was definitely shown by this study of the economic importance of the parked car in the conduct of business.

Although automobile traffic represents a large proportion of the total number of vehicles using the streets in modern American cities, only a relatively small proportion of the people entering the district by various agencies of transportation depend upon the private vehicle. In the Chicago surveys the relatively small part played by the individual car in the conduct of business was brought out by various classes of data. Of the total number of people in the central business district at the time when the maximum number was reached, excluding those who walked in, only 7 per cent arrived by passenger automobile. Previous to the enactment of the no-parking regulations, a half-hour parking rule had been in effect. Under these conditions it was found that a total of 19,447 vehicles used the available parking spaces on a typical week day during the period from 10 a.m. to 6 p.m. This represented about 15 per cent of the vehicles that entered the district during the period; in other words, 85 per cent of the vehicles which entered according to the cordon count, did not use parking space either because they passed through the district en route to some other part of the city, or used off-street parking facilities.

The relative economic unimportance of the parking privilege—far out of proportion to its physical importance as a factor in producing street congestion and traffic delay—is indicated by the comparatively small increase in garage space and parking lots after a full year of rigid enforcement of a total street parking ban. From May, 1926, to May, 1928, the total off-street storage facilities for automobiles increased from 8,732 car capacity to 14,571 car capacity. During the remainder of 1928 there has been only a nominal increase in garage space bringing the total of space available on Jan. 1, 1929, to 17,481 cars. Obviously, therefore, no phenomenal demand for automobile storage facilities resulted from the total abolition of curb parking.

AUTOMOBILE STORAGE CAPACITY IN THE CENTRAL BUSINESS DISTRICT OF CHICAGO, JAN. 1, 1929

Garages	8,781 cars
Parking lots	3,000 cars
Grant Park (pay space)	3,200 cars
Grant Park (free space)	500 cars
Wacker Drive (both levels)	2,000 cars
Total	17,481 cars

Increases in the speed of vehicular movement in the central district following the adoption of the no-parking ordinance, decreases in traffic accidents and increase in the number of vehicles entering the district were cited above as indicative of the effects of the new ordinance. To the casual observer, the streets in Chicago's Loop seem quite free of traffic in comparison with the condition that existed before the enforcement of the new ordinance. Nevertheless actual traffic checks indicate that the numbers of vehicles and people in the district have increased since the new law went into effect, but the traffic moves so much smoother and faster, that the streets, free for the first time from lines of standing automobiles occupying valuable street space along the curbs, seem by comparison to be quite deserted. Actual figures, however, tell a strikingly different story.

More Automobiles Enter District than Formerly

In Chart 1 there is shown a graphical record of the number of passenger automobiles entering the central business district by half-hour periods from 7 a.m. to 7 p.m. on a typical business day in May, 1926, before parking was prohibited, and in May, 1928, after the new law had been in force for several months. It will be noted that more automobiles entered the district after parking prohibition than before, and this condition existed for every half-hour period from 7 o'clock in the morning to 7 at night. The greatest increase occurred between 8 a.m. and 9 a.m. and between 4:30 p.m. and 6 p.m. This increase in the morning was approximately 30 per cent.

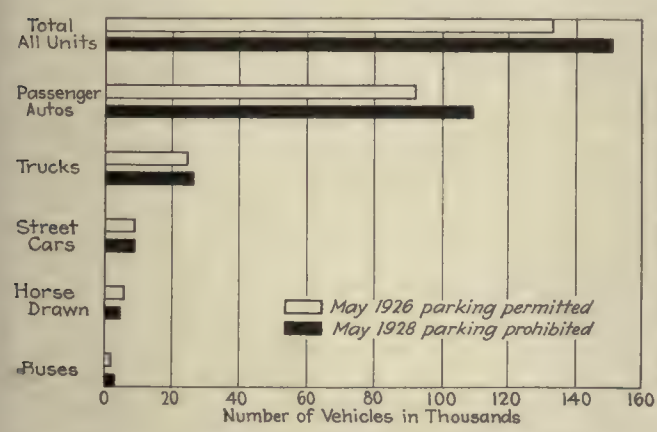


Chart 2—Total number of vehicles of all classes entering the central business district between the hours of 7 a.m. and 7 p.m. on a typical business day in May, 1926, and May, 1928, before and after parking prohibition

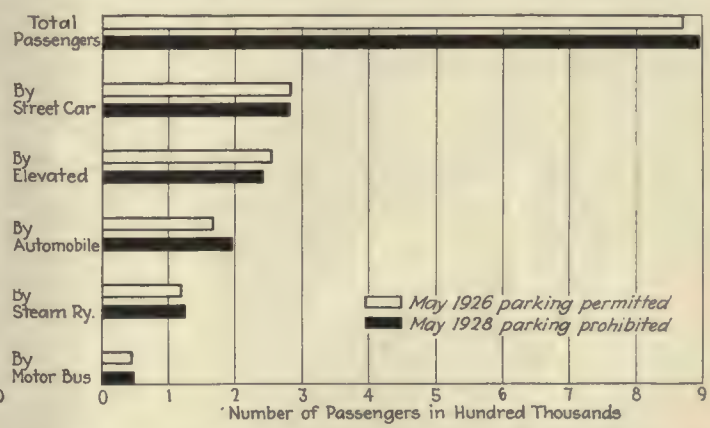


Chart 3—Total number of passengers entering the central business district between 7 a.m. and 7 p.m. by all agencies. Chart gives comparison for typical business day in May, 1926, and May 1928, before and after parking prohibition

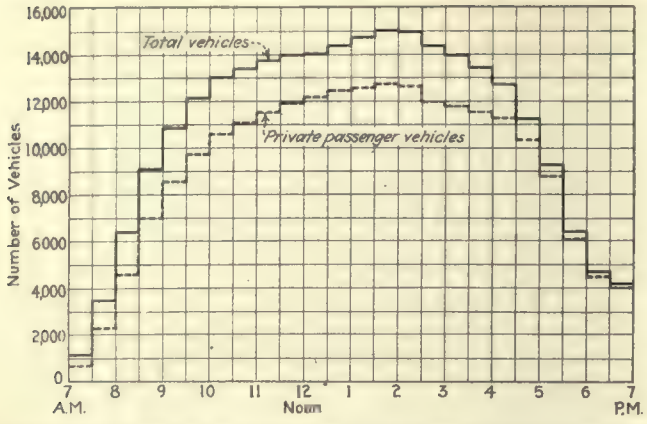


Chart 4—Accumulation of vehicles of all classes within the central business district of Chicago on a typical week day in May, 1926

The effects of parking prohibition upon the total number of vehicles entering the central business district between the hours of 7 a.m. and 7 p.m. and upon the number of passengers arriving by various means of transportation between these hours are shown in the accompanying tabulations and in Charts 2 and 3.

TABLE II—NUMBER OF VEHICLES ENTERING THE CENTRAL BUSINESS DISTRICT OF CHICAGO BETWEEN 7 A.M. AND 7 P.M. ON TYPICAL BUSINESS DAYS WITH AND WITHOUT PARKING

Vehicles	May, 1926 Parking Permitted	May, 1928 No Parking	Increase or Decrease	Per Cent Increase or Decrease
Automobiles....	92,425	109,374	16,949 Increase	18.33 Increase
Trucks.....	24,399	25,665	1,266 Increase	5.18 Increase
Street cars.....	8,432	8,380	52 Decrease	0.62 Decrease
Horse drawn....	5,825	4,283	1,542 Decrease	36.00 Decrease
Buses.....	1,832	2,487	655 Increase	35.75 Increase
Total.....	132,913	150,189	17,276 Increase	13.00 Increase

TABLE III—NUMBER OF PASSENGERS ENTERING THE CENTRAL BUSINESS DISTRICT OF CHICAGO BETWEEN 7 A.M. AND 7 P.M. ON TYPICAL BUSINESS DAYS WITH AND WITHOUT PARKING

Means of Transportation	May, 1926 Parking Permitted	May, 1928 No Parking	Increase or Decrease	Per Cent Increase or Decrease
Street car.....	284,958	282,013	2,945 Decrease	1.03 Decrease
Elevated lines...	256,286	243,594	12,692 Decrease	4.95 Decrease
Automobile.....	166,367	196,873	30,506 Increase	18.33 Increase
Steam railroad..	118,857	124,107	5,250 Increase	4.41 Increase
Motor bus.....	44,391	47,472	3,081 Increase	6.94 Increase
Total.....	870,859	894,059	23,200 Increase	2.66 Increase

It will be noted from these figures that the total number of automobiles that entered the district during this twelve-hour period increased 18.33 per cent, the total number of vehicles increased 13 per cent, and the total number of passengers entering the district increased 2.66 per cent following the prohibition of parking. Obviously, therefore, the elimination of parking had no effect which would be detrimental to the volume of business conducted in the district, and through the reduction of congestion and the speeding of traffic acually increased the number of automobiles and the number of passengers entering the Loop.

Automobiles Carry Small Part of Total Traffic

Although private automobiles amounted to 92,425 out of 132,913 vehicles, or 69.5 per cent, using the streets of the central business area during twelve business hours in 1926, they carried only 166,367 passengers, or 19.1 per cent of the total of 870,859 passengers arriving by various forms of transportation. This relatively large percentage of the total demand for street space represented by the private car is shown graphically in Chart 4, in which the total number of vehicles of all types within the district and the number of private automobiles are plotted for half-hour periods from 7 a.m. to 7 p.m.

Since the no-parking regulations went into effect the appearance of the streets to a casual observer would lead to the opinion that there are a considerably smaller number of vehicles within the central business district than when parking was permitted. Opponents of parking prohibition have actually seized upon this condition as indicative of the fact that the new regulations are keeping automobiles out of the business area, which is held to be detrimental to business, particularly that of retail stores. But actual counts of the number of automobiles in the district before and after parking prohibition indicate how misleading may be casual observations of traffic conditions as a guide in determining policies with respect to regulation.

By cordon counts of the number of automobiles entering and leaving the central business district during each half hour from 7 a.m. to 7 p.m. it was possible to determine the total number of vehicles within the district during each half-hour period of the business day. These counts were made on typical business days in May, 1926, and also in 1928 after the no-parking ordinance had been in effect for several months. The results are shown graphically in Chart 5. Here there is shown in a striking way the fact that though the streets have a relatively deserted appearance following the prohibition of parking there are actually more vehicles within the district than when parking was permitted. Obviously, therefore, the greater ease and freedom of movement resulting from making available for moving traffic all of the existing street space, instead of devoting a large part of the streets to the storage of automobiles, has more than offset whatever inconvenience may have been caused by the parking ban, and has actually resulted in an increase in the number of private cars venturing into the district.

More People in District than Ever

The primary objection to parking prohibition arises from fear on the part of merchants of a possible harmful effect upon business. But the factor of most importance is not the number of vehicles, but the number of people that enter the business district. A complete graphical picture of this phase of the situation existing in the Chicago central area before and after parking prohibition is shown in chart 6. This represents the results of cordon counts of the number of people entering and leaving the district by various means of transportation for half-hour periods throughout the business day. The number of people shown on the chart for each period represents the average number of people actually within the district. This, however, is exclusive of those who walked to and from the area under observation. The chart shows not only that there was an increase in the total number of people within the district, but also that the number who came by private automobile was slightly higher during most of the day than before the enforcement of no-parking. Obviously, there is no indication of any effect that would be harmful to business in the area. By showing graphically a comparison of the number of people coming by automobile and by all forms of transportation, Chart 6 also illustrates clearly the comparatively small part played by automobiles in the transportation of passengers for the conduct of business.

In discussions of proposed traffic regulations for the reduction of congestion, the individual merchant is far more interested in the specific conditions existing at his own establishment than in the general traffic figures of

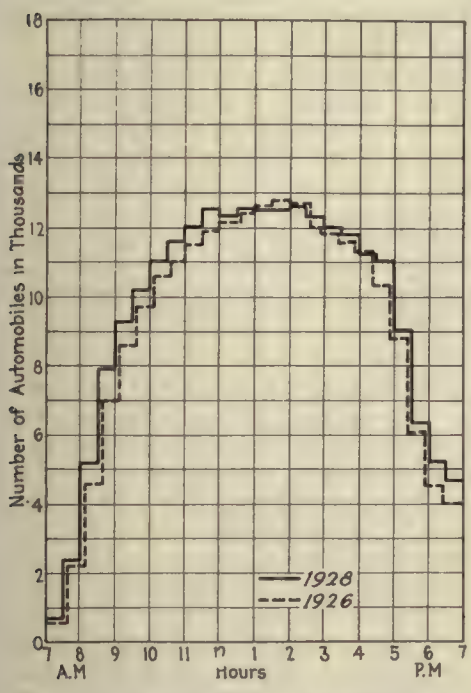


Chart 5—Accumulation of passenger automobiles within the central business district on a typical business day of May, 1926, and May, 1928, before and after parking prohibition. Chart is plotted for half-hour intervals from 7 a.m. to 7 p.m. to show that parking ban made room for increased number of autos in the district

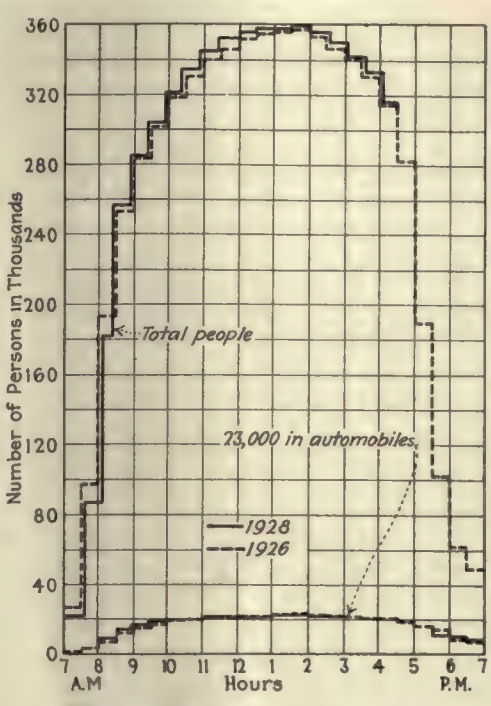


Chart 6—Graphic record of total number of people within central business district who arrived by various means of transportation, plotted by half-hour periods from 7 a.m. to 7 p.m. for typical week day in May, 1926, and May, 1928. This does not include persons who walked to and from the district

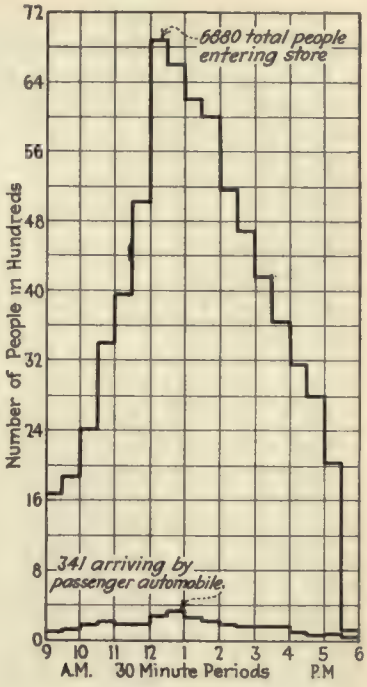


Chart 7—Number of people entering a high-grade State Street department store. Chart is plotted by half-hour periods to show comparison of total people entering store and those arriving by automobile on a typical week day in May, 1928

an entire business district. It is the convenience of the customers who enter his own store that occupies his primary interest. For this reason, the higher-grade establishment catering to an exclusive clientele, or what was at one time known as a "carriage trade," is usually most concerned regarding proposals for the regulation of private automobiles. It is particularly interesting, therefore, to note the data presented by Chart 7, which gives a complete record of the number of people entering a nationally-known, high-grade State Street department store in Chicago during a typical business day.

Checking Results at Individual Stores

For a study of the actual importance of the trade arriving by automobile the number of people entering the store who arrived by that means is plotted on the same chart for each half hour during the business day. It will be noted that the maximum number of people entering in any single half-hour period was from 12 o'clock noon to 12:30 p. m., and amounted to 6,880 persons. The maximum number arriving by automobile in any half-hour period was from 12:30 p.m. to 1 p.m., and amounted to 341 persons. The automobile customers at the maximum half hour amounted to approximately 5 per cent of the total.

There is little doubt left in the minds of any of those who have studied the results as to the beneficial effects of the no-parking regulation on the reduction of congestion, speeding up of traffic and reduction of accidents. On Feb. 15 and Feb. 18 a committee of the City Council had a public hearing on the ordinance. No objectors appeared to make complaints. A change strengthening the ordinance was submitted to the Council and passed first hearing on the 18th.

But this alone does not suffice to prove that this restriction on the right to store automobiles in public streets has not been harmful to business. The statement has been made by those opposing parking restriction in other cities that retail business in Chicago's Loop has suffered from the abolition of street automobile storage.

Published Statements Divulge Business Conditions

In addition to all of the above factual evidence, therefore, it seems worth while to examine the actual record of representative business establishments in the affected district, regarding business experienced during the past year, as disclosed by published statements. In evaluating the significance of these statements by retail merchants in the central district, it is worthy to note that a survey in Chicago indicated that for the first nine months of the year 1928 industrial wage payments to employees were 7 per cent less than for the corresponding period of 1927. Normally, in view of this reduction in industrial wage payments, it would seem logical to expect a slight recession in the volume of retail business done in 1928 in comparison with 1927. But despite this condition, published statements by executives of Loop stores, reviewing the year's experience, are worth examining, since no-parking had been in effect all the year.

In its issue of Feb. 12 the Chicago *Herald and Examiner* carried the following article: Fair Sales at New High Record.—Sales of The Fair in the fiscal year ended Jan. 31 were the largest in the history of the State Street department store and net profits were substantially above the previous year, D. F. Kelly, president, asserted yesterday. The Fair delivered 35 per cent more parcels than in 1920, which heretofore was our largest year, showing that prices are lower today by a substantial sum than they were then, Mr. Kelly said.

In its issue of March 8, 1928, the Chicago *Herald and Examiner* carried the following statement:

"Mandel Brothers sales are showing a substantial increase over last year, it was officially stated yesterday."

In its issue of Dec. 15, 1928, Chicago *Commerce,* published by the Chicago Association of Commerce, presents a review of business conditions in the city during the Christmas buying season, in which are contained statements by executives of a number of important retail establishments in the central business district. These are all optimistic in tone, following a year of parking prohibition, and fail to reflect the slightest evidence of any harmful influence upon retail business of the parking restrictions.

David M. Yates, vice-president Marshall Field & Company, nationally-known high-grade department store: ". . . Our sales have been in excess of any previous year. . . . The crowds are at least as great as in former years. . . . We are set to handle a record-breaking business during the remainder of the month and feel confident that our expectations will be realized."

Arthur Davis, president The Davis Company, popular price department store: "Gaged by our sales to date we confidently expect our Christmas business this year to be much larger than any Christmas business in our history."

John H. Wood, general manager Carson, Pirie, Scott & Company, high-grade department store: "A forecast of our Christmas business based upon the shopping up to the moment would be easily and quickly summed up in the following words, 'the greatest in the history of Carson, Pirie, Scott & Company.' There is a steady and sustained buying throughout the entire store, the results of which are highly gratifying."

H. M. Florsheim, vice-president the Florsheim Shoe Company: "While our particular type of business does not lend itself to Christmas shopping, we nevertheless feel the favorable effect of the Christmas spirit and believe that this year our volume of sales will be far in excess of what it has been in the past."

Raymond E. Durham, president Lyon & Healy, Inc., large musical instrument establishment: "General business during the first eight months of this year showed a little improvement over the corresponding period of 1927, indicating a healthy condition."

W. C. Peacock of C. D. Peacock, high-grade jewelers: "I can honestly say that we have done a better business this year than ever before. And from all indications our Christmas business will also set a new record."

These statements seem enough to indicate the trend of business in Chicago's "Loop" establishments. For the purposes of this article on the experience resulting during the past year of no-parking, they indicate at least that the conversion of valuable street space from a storage area for private cars to the purpose for which it was intended, namely, the movement of traffic, has had no harmful effect upon retail business in the central business area, and gives many evidences of having provided major relief of traffic congestion.

Special Trackwork Specifications Approved

FORMAL approval of the specifications for materials for use in the manufacture of special trackwork recently submitted by the American Electric Railway Association, which acted as sponsor for the project, was announced by the American Standards Association on Jan. 29. These specifications already have been through the standardizing procedure of the American Electric Railway Engineering Association and adopted as recommended specifications for inclusion in the Engineering Manual in place of the earlier specifications W 104-26. The new specifications, adopted as a tentative American standard, are given the American Standards Association designation F 10-1929.

With these actions of approval, the industry now has a complete line of up-to-date specifications covering the field of special trackwork, including not only the materials used therein but also the several distinct types of special trackwork construction now current. The specifications for materials are separate and distinct from those covering the various special types of special trackwork and must be used in conjunction therewith if the full value of the specifications is to be obtained. In other words, they supplement one another. The specifications for materials do not attempt to cover special trackwork as a finished product of any type, but they do control the many different materials used in the assembly of any particular type. There are five kinds of rails, six of castings, six of rolled or forged steel, one of springs and five of fastenings covered by the materials specifications. One item of fastenings is subdivided into five different kinds, making 28 kinds in all.

It will thus be seen why it is necessary to have a materials specification separate from those covering distinct types of special trackwork. The new specifications cover the different materials principally by reference to accepted standards of the various national standardizing bodies for such materials, and the specifications become, to some extent, a sort of directory of specifications for rails, castings, forgings and the like.

All of the specifications of national bodies thus referred to in the materials specifications may be obtained from the several associations and should be included in the files of engineers and purchasing agents, so that prompt reference may be made thereto in connection with details of purchase and inspection, because each of the specifications covering the several types of special trackwork construction refers to the materials specification under the head of "Materials" in the text.

Since the sectional committee which prepared the new specifications comprised representatives of the American Railway Engineering Association, American Society of Civil Engineers, American Electric Railway Association, American Society of Mechanical Engineers, Association of American Steel Manufacturers, American Short Line Railway Association and the Manganese Track Society, it will be apparent that all important user and manufacturer interests having to do with special trackwork materials have joined in the work of preparation of the new specifications and have assented in their adoption as an American tentative standard. In view of this there is every good reason why the new specifications should be taken up promptly and put into use by those having to do with the purchase of special trackwork. Furthermore, the new specifications are, in effect, an amplification and combination in somewhat expanded form of the materials portion of the existing A.R.E.A. specifications for switches, frogs, crossings and guard rails adopted in March, 1921, with March, 1922, supplement and of A.E.R.E.A. specifications for special trackwork materials W 104-26.

Philadelphia Subway Cars Designed for

Speed, Safety and Convenience

Two 210-hp. motors per car give free running speed of 47 m.p.h. Cars are all-steel construction and weigh 110,000 lb. They will seat 75 and carry 212 passengers. A total of 150 cars built at a cost of $40,000 each



150 cars of this type were built at the J. G. Brill plant for the Broad Street subway in Philadelphia

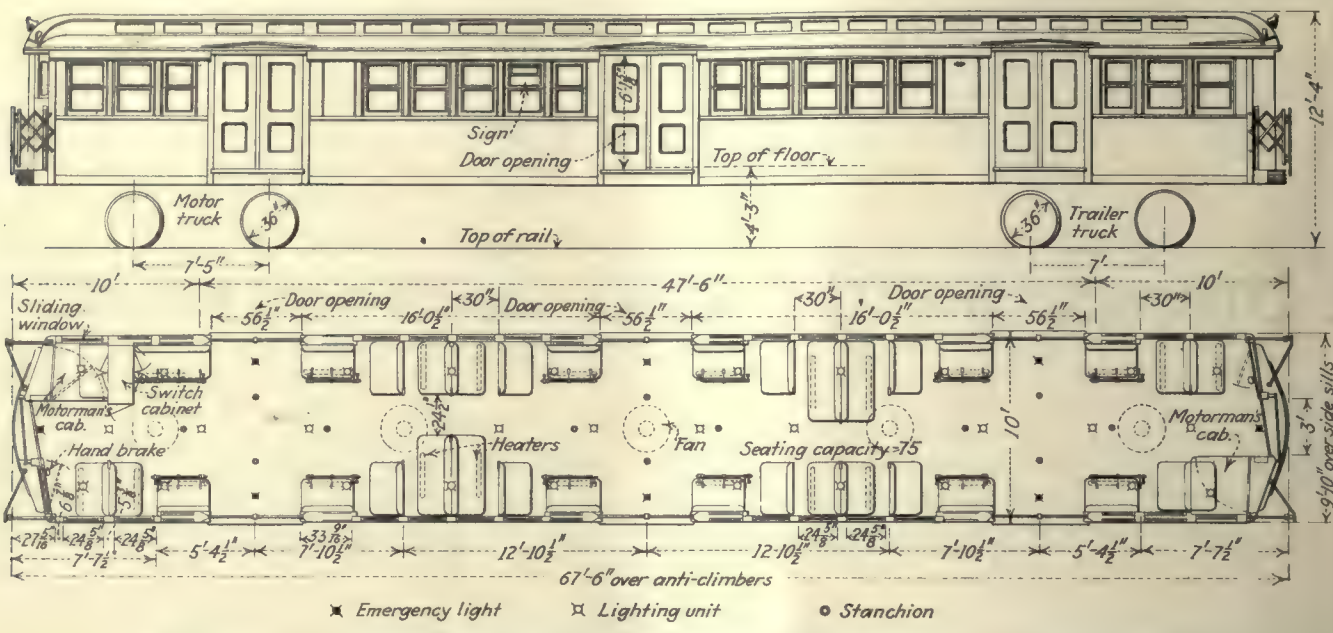
In the Feb. 9 issue an article was published showing the relation of the Broad Street subway to the existing and future transit facilities of the city, giving operating details and describing the general construction. In future articles the Fern Rock shops and terminal, the distribution equipment and the signal system will be discussed.—EDITOR.

PLANNED to combine ample capacity and a maximum of passenger comfort, the 150 passenger cars built for the city of Philadelphia's new Broad Street subway by The J. G. Brill Company embody many unusual features of design. Prior to their construction an extended investigation was made by the Department of City Transit of the local requirements and of car practice and experience on other subway or elevated systems, railroads and street railways. Among the factors given careful consideration were seating capacity and arrangement, speed of unloading and loading, ease of movement between station platforms and seats, safety of passengers and crew, utilization of track capacity, etc. This study led to the decision to use large cars, giving greater flexibility in seating arrangement and lower costs per passenger carried for crew, power and maintenance, because of the smaller number of units.

The car is 67 ft. 6 in. long over the anti-climbers, 10 ft. wide over all and 12 ft. 4 in. high from top of rail to top of roof. The completed car, including all equipment, weighs 110,000 lb. The cost of each was a little less than $40,000.

The general plan of the car is so arranged that it is divided into three sections, giving ample space near the doors for the egress and ingress of passengers. Seventy-five seats are provided in each car, of which 50 are cross-seats, arranged with ample knee room, wide aisles and with a 17-in. seat space. The total capacity of the car, on the basis of 2 sq.ft. of free floor space per standee, is 212. Seats are the stationary spring-cushion type, covered with rattan. For the convenience of standees, there are grab handles on the ends of the cross-seats, hand straps suspended from the roof in front of longitudinal seats and stanchions located conveniently in front of the side door openings. Advertising card racks are provided in the lower deck of the roof and at other conspicuous places in the car.

Each car has three large double-leaf doors on each side, spaced equidistantly from each other and from the ends of the car. Operating cabs are placed in diagonally opposite corners and at the back of one cab is located a switch cabinet. Communication between cars is by means of wide end doors, there being no platforms. All doors are constructed of aluminum, except those for the switch cabinets. The end door is provided with a drop sash and the door lock is of the Howard friction type, which



Floor plan and side elevation, showing the principal dimensions and the arrangement of seats and doors. Each car seats 75 passengers, 50 of that number on crossseats

prevents the door from slamming when being closed.

Pantograph safety gates are attached to each corner of the car, which automatically meet to prevent passengers boarding the trains or falling between cars at stations. Three safety chains covered with rubber are provided between cars on each side of end doors.

Door Mechanism Has Single or Multiple Control

The side doors are opened and closed by pneumatic equipment, electrically controlled. The guards operate the doors from the cabs, which are equipped with special windows, grab handles, etc. An arrangement has been developed permitting control of all doors of the train, or separate control on individual cars, depending on the setting of a master switch in each cab. From an operating position in any one of the cabs, the doors on the same side of that car and of other cars in front or in back can be opened and closed by manipulating two tumbler switches. Red lights on the exterior of the car body are lighted if any door on that car is open,



The car front is equipped with marker lights, a panel for the route number, a headlight and two automatic safety gates



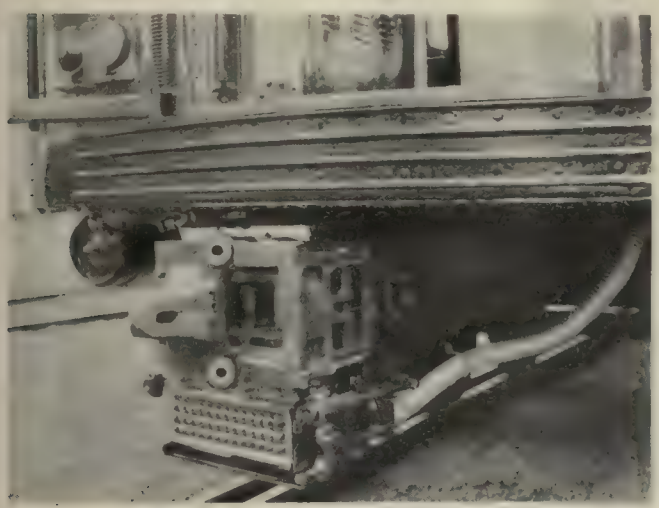
Ample illumination, a white ceiling and relatively light-colored side walls give the interior a cheerful appearance

and a green signal lamp in the motorman's cab lights only when all doors on the train have been closed. An auxiliary buzzer signal system is installed for use in case the light signal system fails. Another special device enables the motorman, in case of overrunning a station platform, to nullify the door-operating circuits, preventing the guards from opening the doors, or if they have already been opened, closing them automatically. Push buttons on the outside of the car enable platform men to close individual doors, and key switches on the center doors enable the operating force to pass in or out easily when done. In case of failure of air or electric supply, certain of the doors can be opened mechanically from the inside, and one of them from the roadbed.

An emergency bell placed in each cab can be energized from a push button located on the inside of the car at the center door. These buttons are in cases with glass covers, which can be broken by the passengers, using a small hammer hung near the cases. The current necessary for operating the various relays, magnet valves, etc., is supplied by the same 32-volt storage battery that supplies emergency lights, tail lights, and other control circuits. All circuits, except those to the main motors, are fused and controlled at two switchboard panels built into the cab walls.

Cars Well Ventilated and Heated

Ventilation is provided for by adjustable shutters in the monitor roof, drop sash in the upper half of the windows, panels in the end doors and five 38-in. electric ceiling fans. All sash is of extruded aluminum. The upper sash of the side window is arranged to drop. The windows are glazed with double thick American AA glass and the doors with $\frac{3}{16}$-in. crystal plate glass.



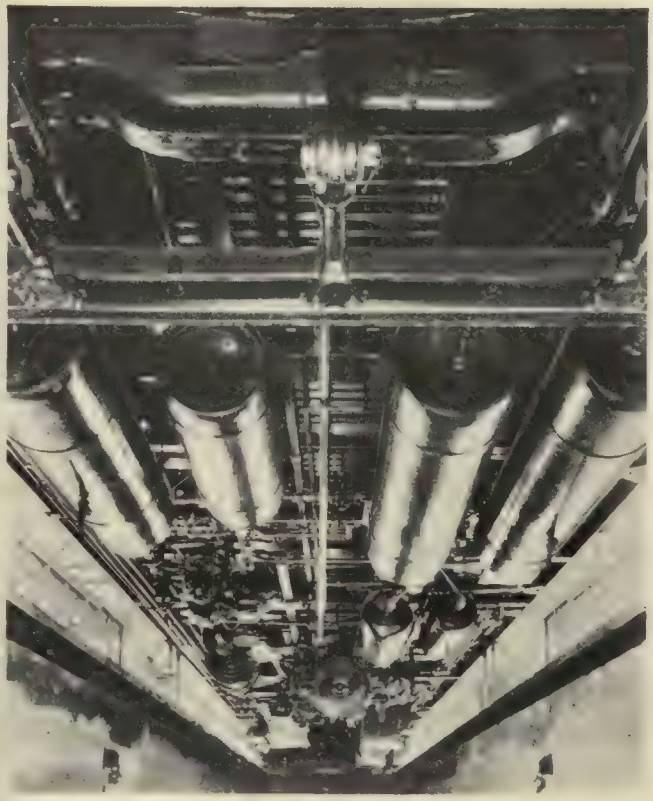
Automatic couplers are part of the equipment

Twenty-four electric heaters are located under the car seats. They are thermostatically controlled. A new feature incorporated in the control of the heaters is a relay which opens the heater circuit while the train is accelerating, thereby reducing the peak loads and resulting in substantial economy, because the rates charged for energy depend upon the maximum demand.

The regular lighting system consists of 22 series lights of 45 watts each, arranged in three rows along the center and each side of the car. These lights are mounted in compensating fixtures arranged so that when one lamp burns out the others continue to burn. Low-voltage emergency lighting units are placed over each of the doors. Ample illumination, a white ceiling, and relatively light-colored side walls contribute to a cheerful looking interior.

High speed electric railway practice was followed closely in the design and construction of the cars. Steel structural shapes are used for side and center sills, pressings and castings for the other members of the frame. The side and center sills of channel shapes extend in one piece from buffer sill to buffer sill. The car flooring is fastened to special pressed steel Z shapes secured to the side and center sills. The flooring is of Chan-arch and the wearing surface of $\frac{3}{8}$-in. Tucolith.

The body bolsters are built up of two pressed steel pans placed back to back and reinforced on the top and



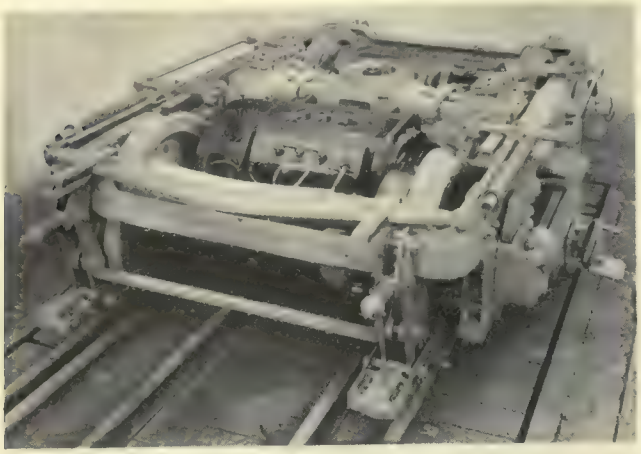
Underside of the car showing air reservoirs, compressor and, in the extreme back, the grid resistors and control equipment boxes

bottom with cover plates. Between the center sills are steel castings. The cross bearers are built up of steel pans with top and bottom cover plates. The frame is stiffened with end cross plates and diagonal braces of pressed steel. Hedley anti-climbers are secured to the buffer sills.

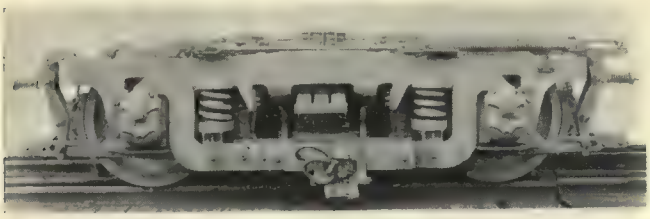
The side frames were designed as girders to carry the entire load of the body and passengers, with the cross bearers delivering loads to the side frame. The side frame, in turn, delivers the load to the bolsters and thence to the trucks at the center plates. The side frame is of pressed steel construction; the top plate is formed of a special type of U pressing, extending in one piece from end to end of car. The intermediate posts are of a special flange U pressing. The side girder plate is $\frac{1}{8}$ in. thick and above the windows is a $\frac{1}{8}$-in. steel letter board. Special attention was given to the design of the posts at the end side doors because of the heavy stresses concentrated at these points. The roof is the monitor type carried on continuous flanged U shaped steel car-



Each motor truck is equipped with two 210-hp., 600-volt, commutating pole, field control, dual ventilated, direct-current motors



A motor truck and a trailer truck, spaced on 47 ft. 6 in. centers, support each car



Trucks are of the M.C.B. equalizing type with one-piece cast steel frames

lines, which extend from side plate to side plate. All steel throughout the car is copper bearing, conforming to A.S.T.M. specifications.

The couplers are the Van Dorn car, air and electric type, designed especially for subway service. They are of the tight lock type, so arranged that when coupled all connections are made up automatically. Uncoupling can be done from the ground or from the cab of either car. A feature incorporated in the coupler cutout switch is the interlocking of the motorman's door signal light, tail lights, marker lights and train number sign light. The Waugh draft gear is used which has a capacity of about 90,000 lb. when compressed 1½ in.

Trucks Are Equalizing Type

The cars are mounted on a motor and trailer truck with 5½x10 in. journals. The trucks are the M.C.B. four-wheel equalizing type equipped with the Simplex clasp brakes, Commonwealth Steel Company's cast-steel one-piece frame, Symington journal boxes, Stucki side bearings, oil bearing brass lined center plates, cast-steel bolster, Ellcon height adjusters, Sauvage shim slack adjusters on the motor truck, Rolman rolled manganese steel wear plates, rolled steel wheels, A.S.T.M. quenched and tempered axles, and A.E.R.A. type solid bronze bearings.

On six of the cars, twelve trucks, Hyatt roller bearings are used instead of the 5½x10-in. friction bearings. Cast integral in the Commonwealth Steel Company's truck frame are the side sills, transoms, end sills, spring caps and pedestals. Mounted on the outside equalizing bars are the third rail shoe beams on which are assembled the Champion collector shoes. These shoes are held under a spring tension of 20 lb. against the third rail.

The motor truck is equipped with two Westinghouse 210-hp., 600-volt, direct-current, commutating-pole, field-control, axle-hung railway motors, driving through helical gears and pinions. A distinctive feature of the motor is the dual system of ventilation. One current of air enters the armature bearing housing at the commutator end, passes under the commutator, through the armature core longitudinally, and out through the fan at the back end of the motor. The other air current enters through openings in the frame back of the commutator, which is baffled from this air, passes through the air gap and between the field coils, continuing through the double-bladed fan and out at the back end. Thus none of the air passes over the commutators, and troubles due to dirt and brakeshoe dust are avoided. Also the wear on the brushes is decreased.

Both the motors and the control equipment have been designed especially to give rapid acceleration and high schedule speeds under the conditions of subway service. The motors are geared to propel empty cars at a speed of approximately 47 m.p.h. on level tangent track, and to maintain a speed of 24 m.p.h. with a fully loaded train on the 3 per cent grade between the Logan and Olney Avenue stations. Multiple-unit control, of the unit-switch electro-pneumatic type, has been provided, with a unit master controller in every cab.

Features of Air Brake Design

Electro-pneumatic air brakes of the Westinghouse Traction Brake Company's AMUE type give the trains, of eight cars and less, smooth retardation. They are designed for quick recharge after emergency; charging during electric holding; graduated release; electric and pneumatic service, emergency and release positions which are the same on the brake valve and which permit emergency braking during or immediately after a service application. The service brake cylinder pressure is 50 lb. per square inch. The emergency cylinder pressure is 70 lb. per square inch, obtained from the train pipe of 85 to 100 lb. per square inch pressure through a limiting valve set at 70 lb. Each car is provided with an air compressor of 35 cu.ft. capacity, arranged so that all govern-

Weights, Dimensions and Equipment Details of the 150 Broad Street Subway Cars, Built by Brill

Weights:	
Car body	54,000 lb.
Trucks	34,210 lb.
Equipment	21,790 lb.
Total	110,000 lb.
Length over all	67 ft. 6 in.
Width over all	10 ft. 0 in.
Height, rail to top of roof	12 ft. 4 in.
Bolster centers	47 ft. 6 in.
Motor truck wheelbase	7 ft. 5 in.
Trailer truck wheelbase	7 ft. 0 in.
Air brakes	Westinghouse AMUE
Anti-climbers	Hedley
Armature bearings	Plain
Body	Steel
Brake shoes	Diamond S
Compressors	Westinghouse D3-F
Conduit	Rigid metal
Control	Westinghouse ABF
Couplers	Van Dorn, car, air and electric
Curtain material, motorman's curtains	Pantasote
Destination signs	Hunter
Door hangers	Diamond ball bearing
Door mechanism	National Pneumatic Co.
Doors	Sliding, side and end
Draft gear	Waugh
Dust guards	Symington
Energy-saving device	Thermostat
Fans	Westinghouse, ceiling
Finish	Steel painted
Floor covering	Tuco Products Corp.
Glass	Double thick American AA
Hand brake geared	Peacock
Hand brake handle	Adams & Westlake
Hand straps	Rico Steel-Kar
Heaters	Consolidated Car Heating Co.
Headlights	Crouse-Hinds WDN
Headlining	Agasote
Height adjustor	Ellcon
Interior trim	Brass, nickel plated
Journal bearings	5½x10 A.E.R.A.
Journal boxes	Symington
Lamp fixtures	Adams & Westlake
Motors	Westinghouse 581-A-1, 210-hp., inside hung
Roof type	Monitor
Roof material	Sheet steel
Safety car device	Dead man's control
Sash	Aluminum, O. M. Edwards
Seats	Brill, longitudinal and cross
Seat capacity	75
Seating material	Rattan
Side bearings	Stucki
Slack adjusters	American Brake Co. and Sauvage
Steel flooring	Chan-arch
Storage battery	Edison
Third rail collectors	Champion
Ventilators	Hinged shutter type
Wheels	36-in., rolled steel



In this steam-operated motor coach the generators are at the extreme rear and the engine is ahead of the rear set of wheels

ors on a train are electrically connected and any governor can cut in all of the air compressors. On each truck is provided an automatic train stop which, when passing over a track trip which is in a raised position when signals are at "danger," causes an emergency application of the air brakes.

The hand brakes are connected as an integral part of the foundation brake rigging at the cylinder levers. The brake handle is the Adams & Westlake ratchet type. At the lower end of the brake staff there is located a train of gears of the Peacock type to multiply the power delivered from the brake handle to the foundation brake rigging.

Before opening the Broad Street subway to the public, it was necessary to make thorough tests of every part of the equipment and to undertake preliminary operation to have all parts functioning properly. The first step was getting the substations into service, and adjusting the equipment so that the various supplies of power could be maintained. Getting the different stations correlated and adjusted required many trials. Furthermore, as the capacity and arrangement of this equipment was unusual, considerable time was required to train the men. After power was supplied to the third rail, trains were operated on slow schedules to test the equipment, check clearances and obtain data to insure that all the apparatus would function properly. It was necessary also to test the electro-pneumatic interlocking control of track switches in service, together with the automatic signals and train stops. The scope of operation gradually was extended until six-car trains were being run from City Hall to Fern Rock yard, making the normal stops at the calculated schedule speed.

Each car was operated under all conditions and over all track for an average of about 600 miles. As there are 150 cars, this preliminary testing and training of personnel required a long period of time. The Fern Rock shops were opened during the tests so the cars could be inspected, overhauled and maintained as required.

Enlarged Facilities For Instruction at Morgantown

AN ASSEMBLY hall with a seating capacity of 150 is being constructed by the Monongahela West-Penn Public Service Company on the eighth floor of its building in Morgantown, W. Va. Partitions between four offices and a hallway are being torn down, and the large room is being redecorated. Folding chairs will be placed in the room. It will be used for holding classes and for general meetings of employees.

Experimental Steam Coach Has Eight-Cylinder Motor

Flexibility and power reserve are advantages claimed by its designers

REDUCED cost of operation and increased flexibility are the major claims made for a pre-manufacturing model steam operated motor coach recently designed and built under the supervision of D. McCall White and his associates for the Automotive Syndicate, Ltd., of Indianapolis, Ind. This operating model bus has been on the road, under test, for some months, and it is claimed that its reduced operating expense is due to lowered fuel and mechanical maintenance cost. Its smooth riding quality, improved ventilation and vision, absence of jerks on starting and stopping, and absence of gear and axle noises, should appeal to the riding public, according to the designers.

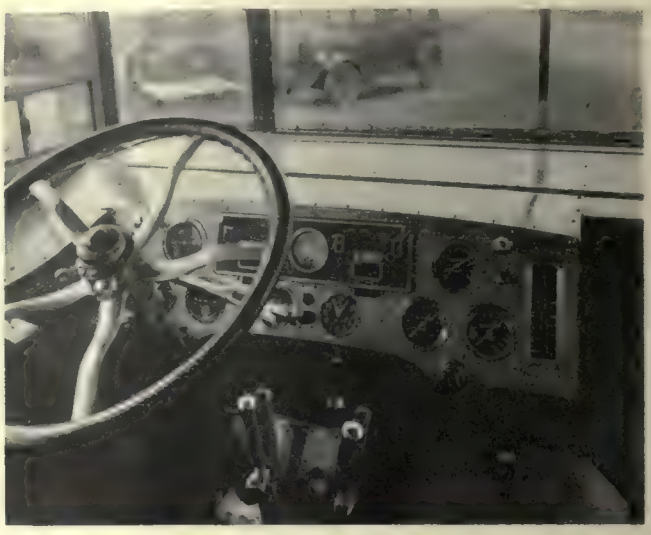
The coach is of the modern street car type design. It seats 40 passengers in addition to the operator, and its aisle permits a number of standees. The body is combined with the chassis, the various operating units being mounted directly on the framework of the body.



The main condensers are located in the front of the bus

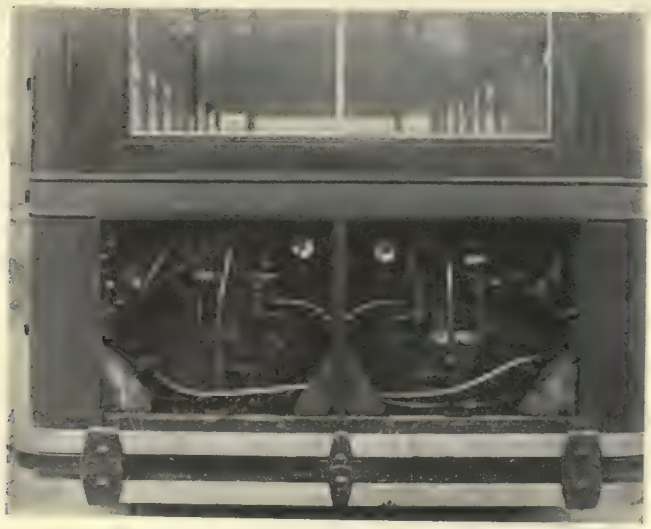


Comfortable seating is provided for 40 passengers, exclusive of the driver

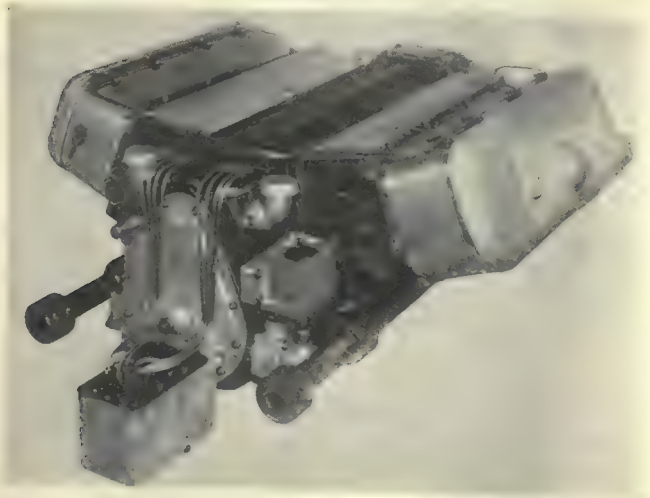


The instrument panel is conveniently arranged within reach of the driver

They are readily detachable from pits underneath, there being no necessity of working from above. The wheelhousings are part of the body and the framework and carlines extend in one piece from one side of the body frame to the other. This bus is provided with front entrance and center exit, folding-type doors, which are air controlled by the driver.



View with the rear panel removed, showing the position of the two steam generators and electric motors, with their respective distributor heads



The eight-cylinder poppet-valve steam engine is provided with a cylinder lubricator on the front end

Steam is produced in generating units of a new type, located in a compartment in the rear of the vehicle. They burn fuel oil and it is claimed that they are non-explosive. The bus is driven by an eight-cylinder reciprocating steam engine of the poppet-valve type, which is located beneath the floor near the center of the vehicle. The rear axles are driven through twin worm gears, without interposition of a clutch or change gears.

A small auxiliary steam engine provides power for the operation of the electric generator, condenser fans and air compressor. The main condensers are located at the front of the coach body, with auxiliary condensers placed in the roof. All of the operating units are installed below the floor level and are designed for quick service replacement.

The Automotive Syndicate, Ltd., is purely a pre-production organization, the purpose of which was to design and build a pre-manufacturing model of the motor bus powered by steam, using a patented steaming system developed over a period of several years of experimental and research work. This pre-manufacturing model has been completed, but details of the future manufacturing program and a technical description of the various mechanical units employed are not yet ready for release.

Expanding Services on North Shore Line

ADDITION of three new limited trains operating daily between Chicago and Milwaukee, two Chicago-Waukegan expresses and one local from Waukegan to Chicago are features of the new operating schedule of the Chicago, North Shore & Milwaukee Railroad which became effective on Jan. 20. This new service is largely for the convenience of persons wishing to reach their destination quickly at a late hour, such as theater-goers of persons attending meetings. The additional trains make a total of 45 limiteds operated by the North Shore Line daily between Chicago and Milwaukee, making stops also at Racine, Kenosha, Zion, Waukegan, North Chicago Junction and Niles Center. Between Chicago and Waukegan, 81 trains are operated daily, while the limiteds make a total of 122 trains serving Waukegan residents daily.

TRACK MATERIALS

Specially Designed for New York City Subways

By Robert H. Jacobs
Division Engineer
Board of Transportation, New York



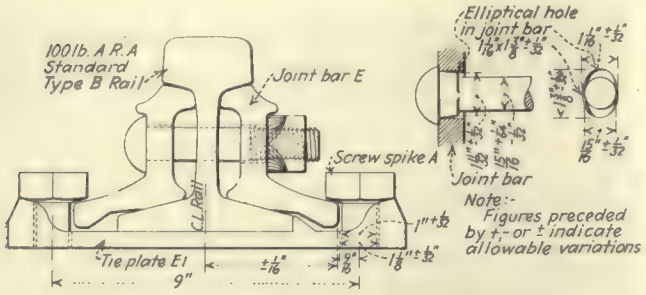
Double housed switches, as used on the B.-M.T. and new subway lines

High carbon rails are used on tangent track, with manganese rail for parts of special work. Most convenient length for handling found to be 33 ft. Accurate manufacture of screw spikes essential. A 150-lb. section is used for third rail.

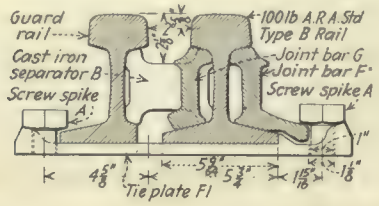
DUE to the large number of sharp curves on the lines of the new city-built subways in New York, it has been necessary to provide a large amount of guarded construction. This condition has made it necessary for us to provide many special parts to meet the unusual requirements encountered in this situation. The solution of the problems presented has many points of interest.

When the track standards for the existing dual system of subways operated in New York by the I.R.T. and the B.-M.T. were determined upon, the 100-lb. section had already been adopted for the existing subway. At that time the A.R.A.-B rail section was becoming very popular, and while the Interborough was inclined to favor the extension of the use of the modified A.S.C.E. section for the new lines, the representatives of the city and the B.-M.T. favored the new section. After considerable discussion the latter was adopted. The outstanding differences between the two sections are less slope of the head and a narrower and thicker base for the A.R.A.-B rail. While a somewhat lighter rail would, of course, carry the traffic satisfactorily, the use of a larger section is amply justified by the saving in maintenance and renewals.

On account of special conditions, a higher carbon rail than ordinarily used on steam railroads has been found to



Joints at unguarded rail showing B bars



Joints at guarded rail showing F and G bars

be practicable. Our specifications call for a carbon content of 0.73 per cent to 0.86 per cent, instead of 0.62 to 0.77 per cent commonly used on steam railroads for this weight of rail. These harder rails, of course, give us longer service.

In general, rolled manganese rail was used on tracks for the dual system on curves of 700 ft. radius and under. The initial purchase of manganese rail for the greater part of the tracks of the dual system was made at a price of about $85 a ton. Since that time the rail has practically doubled in price, whereas the increase in price of the open-hearth rail has been only about 43 per cent. Records of the service on our lines of manganese rail and of high carbon open-hearth rail are not very consistent. Without any question the manganese rail has a much longer life under traffic than open-hearth rail, but it is liable to corrugation. It also has a considerable disadvantage due to the impracticability of cutting and drilling this rail in the field. This affects both original installation and renewals, as well as bonding. On account of these considerations, including its high price, there is a tendency to limit its use. Our standards for the new city subways do not call for the use of manganese rail except for parts of special work most subject to wear.

We are continuing the use of 33-ft. rails, although longer rails are now being used by many railroads. While a reduction in the number of joints is desirable, our determination was based on the difficulties of handling rails longer than 33 ft. in the restricted space in the subway.

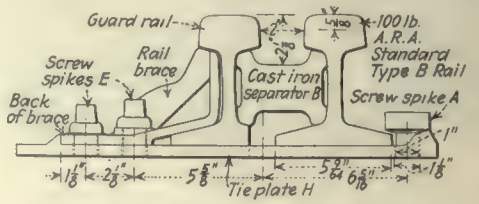
The joint bars adopted for the new city subways are similar to those now in use by the operating companies. The "head free" feature providing contact at the top of this bar with the web, instead of supporting the head of the rail near its outer edge, is interesting. Two advantages claimed for this bar are, first, that the joint assumes its final position when applied, assuring the maintenance of perfect alignment through the joint from the time of first application, and second, that the so-called "anvil action" of the wheels on the joints is eliminated, because the underside of the railhead is left entirely free, permitting the railhead to act at the joints the same as throughout other parts of the rail. Another advantage claimed for this "head free" feature is that metal may be omitted from the under faces of the railhead, where it is of no use, and an equivalent amount of metal added to the top of the head, thereby increasing the life of the rail.

The standard "E" bar with alternate round and oval holes is used for all joints except those on the low side of guarded curves and in special work. On guarded curves a so-called "G" bar is used between the running rail and the guard rail. This bar is identical with the standard "E" bar, except that the lower flange is omitted, due to the limited space in which it is to be placed. These bars have round holes only. Bars of standard section are provided with oval holes only for use on the outside of the guard rail, and of the running rail on the low side of curves. The use of bars with all round holes or all oval holes on the low side of guarded curves is due to the necessity of placing the track bolts with their heads on the outside of the rails to facilitate removal.

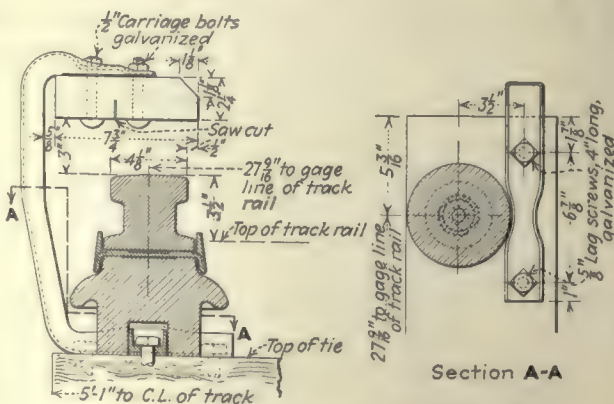
Welding of rails as an alternative to the use of splice bars has received some consideration, but has not been adopted, largely due to the difficulties of making renewals under traffic.

Contrary to the usual railroad practice, a special type of bolt was adopted for the tracks of the dual system. This bolt has a round neck and a large head, the latter being flattened on two sides so as to fit under a rib at the top of the splice bar in order to prevent turning. This made it possible in the dual system to use splice bars with round holes only. On tangent track and unguarded curves the bolts are placed with the heads on alternate sides of the rail, in accordance with the general practice. As previously stated, on guarded curves it is necessary, in order to be able to back out the bolts, to place all the nuts between the guard rail and the running rail. It was found, after years of use, that this type of bolt, in spite of its advantages, had disadvantages which have led us to abandon it and adopt an oval-neck track bolt with a ratchet or Harvey Grip thread, notwithstanding the fact that it has required the furnishing of bars with special punching for use in guarded construction.

Tie plates for ballasted track are designed for use with cut spikes. The standard "A" plates for use on tangent track and unguarded rails on curves present no special features, but correspond to those in general use. However, special plates are required for use at joints, in



Separator and tie plate H for screw spikes



150-lb. third rail with bracket and insulator

guarded construction and in special work. A careful study of manufacturing tolerances was required in order to determine the proper dimensions of the special plates. Tie plates for concreted track are designed for use with screw spikes and require bosses for the support of the screw spike heads in a position to allow a $\frac{1}{16}$-in. space between the bottom of the head and the flange of the rail.

It was the early practice on some other railroads to turn down the screw spikes tight on the rail, but this resulted in a movement of the spike in the tie affecting the serviceability of the construction. The $\frac{1}{16}$-in. space between the head of the screw spike and the flange of the rail has overcome this difficulty.

Only two types of screw spikes are used in our work. Screw spike "A" is the standard track spike for concrete track, while screw spike "E" is used principally for rail braces in curved track and in special work. The accuracy of the manufacture of the screw spike is of the greatest importance; first, in order that the space between the head of the screw spike and the flange of the rail may be maintained, and second, that the groove formed in the wood of the tie block with the first thread of the screw may be followed by the remaining threads in such a way as not to injure the fiber of the wood. In replacing screw spikes, the groove in the wood should be followed by the threads of the new spike. These conditions are not met in the so-called "commercial" screw spikes.

Service requirements necessitate a substantial form of guarded construction consisting of rail braces on the outside of the high rail, and rail braces on the inside of the guarded rail on the low side. Guard rails are secured to the running rails by bolts passing through separators, separators being needed to provide the necessary flangeway. Although the separator bolts have been placed at frequent intervals, there has been a large amount of breakage under traffic. Several special designs have been developed to obviate this difficulty, but to date none has been tested on our rapid transit lines. The operating companies have been experimenting with the use of guard rail clamps similar to those commonly used opposite frogs on steam railroads. However, these are expensive and clumsy and not well suited for use on concreted track, as they require the omission of a large amount of concrete between the tie blocks.

In our new design we are seeking to minimize this difficulty by providing bolts manufactured to a special specification which will have greater elasticity and will be less liable to breakage. We are also modifying the design of the separator, providing a larger hole for the bolt, and have adopted a headlock washer which has shown good results.

Rail creepage has in the past been the cause of a great deal of difficulty in maintaining tracks, and the use of anti-creepers to overcome this trouble has been the development of comparatively recent years. On the first subways no anti-creepers were used, but when work was started on the tracks for the dual system three anti-creepers to the rail length of 33 ft. were adopted as standard. Under actual operating conditions, this number of anti-creepers was found to be insufficient to hold the rail, necessitating a considerable amount of maintenance work which often required bucking of rail for a long distance. As the result of this experience, for the last few years we have used five anti-creepers to the rail length, which has proved satisfactory. In general, experience indicates that rail creepage occurs in the direction of traffic, more or less regardless of grades. Determinations in this matter are the result of intensive surveys which we have made of tracks under operation.

On account of the high cost and great difficulties involved in making renewals it has been the uniform practice to provide ties manufactured from a very high class of material. For the ballasted track, including the special work, our specifications call for first growth, longleaf, Southern yellow pine. No tie is acceptable with less than three heart corners, or with more than 1 in. of sap on the fourth corner or with more than $2\frac{1}{2}$ in. of sap, measured across the face anywhere in the length of the tie. Variations up to $\frac{1}{4}$ in. in width and depth and up to $\frac{1}{2}$ in. in length are accepted. These ties are delivered cut to the correct dimensions. Standard 6x8-in. ties 8 ft. long, and ties 9 ft. long for the support of the third rail, are used, with ties of various lengths as required for special work, which in some cases run up to $27\frac{1}{2}$ ft. in length.



Lapped switches, as used on the Interborough Rapid Transit Line

For the concreted track, as described in an article published in this paper Feb. 2, creosoted timber is used of the same quality as for ballasted track. These ties are furnished to exact dimensions 10 in. wide and 6 in. high, with holes drilled for screw spikes, for anchor bolts where used, and for lag screws used for fastening the third rail insulator cups and brackets. The holes are exactly spaced by templet prior to creosoting.

Long life is expected for these ties, based upon the present condition of similar ties which have been in service for about twelve years. A recent inspection shows little deterioration, and practically no tie cutting or failure in the screw spike holes. Because the ties are protected from extreme weather conditions it may be expected that deterioration from decay will be slow, and on account of the use of practically all heart timber, comparatively light wheel loads and the use of tie plates, there has been practically no deterioration from tie cutting.

On tangent and long radius curves, unused holes in the tie plates make it possible to drill new holes in the tie blocks after the first holes are unserviceable. In the case of sharp radius curves, where due to double spiking and

other reasons it is impossible to provide spare holes, this cannot be done. However, the use of ties 10 in. wide with tie plates 7½ in. wide renders it possible in future to plug old holes, shift the tie plates, and drill new holes.

Standard frogs and switches are used wherever possible in our special trackwork. However, the many limiting conditions of the alignment necessitate the designing of numerous non-standard layouts. The greater part of our special work is of much sharper curvature than on steam roads and consists of No. 6 and No. 8, with some No. 10 and No. 12 turnouts of radii from 350 ft. to 1,350 ft., whereas in the case of high-speed crossovers on steam railroads the numbers run anywhere from No. 12 to No. 20 and even No. 30, with very few under No. 12. As a result we provide a large amount of guarding through the special work, which is not required ordinarily in steam railroad practice. Our switches are double housed for facing switches and single housed for trailing switches, with guards in front of the housings. Switch points up to a No. 8 are guarded on the turnout side. The wing rails of frogs are extended by guard rails.

For the dual system, lapped switches have been used on the Interborough lines, with guards opposite the extended points, whereas on the Brooklyn-Manhattan lines housed switches have been used. We are following the Brooklyn-Manhattan practice in this regard for the new city subways. The use of the lapped switches for the Interborough lines was based on the contention that the rolling stock is so designed that with extreme rail and wheel wear the equipment on the under side of their cars would not clear the housing, which extends ¾ in. above the top of new rail. Our new cars are similar to the Brooklyn-Manhattan Transit cars in having clearance between the equipment and the rail.

Rail built-up frogs are standard for our work. After years of service these frogs have proved entirely satisfactory and are particularly advantageous from the point of view of repairs under service. We have in a few instances installed solid cast manganese frogs. These have been in track for three years and are being watched in service. However, they are open to the objection of difficulty in repairs under operation in case of breakage.

The advantage of the use of housed switches, especially for subway tracks, consists principally of more guarding at the extreme points of the switches. In this form of construction there is an offset in the stock rail, which makes it possible to thicken up the switch point, thereby adding to its stability and life.

Rolled manganese rail is used in special work for parts that are subjected to hard service, especially frogs for main line. Where it is necessary to provide for very frequent train movements, switch points and curved lead rails of rolled manganese are also provided.

For the dual system the third rail, bonding and insulated joints, as well as signal interlocking, etc., were installed by the operating companies as equipment, while for the new city subway all this work is being done by the city. The installation of the third rail, bonding of the third rail and installation of the insulated joints and of conduits in the trackways are all included in the track contracts. The track contractor's equipment for handling materials is suitable and available for handling the third rail, and the work can be carried on to advantage by him in connection with his track work. The necessity of providing for positive and negative cables, lighting, escalators and circuit breaker connections require that a large number of conduits be placed in the trackways. These conduits must, of course, all be placed in advance of the concreting. Delays and interference are reduced to a minimum, due to having all of this work executed by one contractor.

In general, the standard section of the third rail is 150 lb. per yard of special section, with the third rail protection boards supported by brackets from the tie blocks extended for that purpose. The insulated joints are installed in the tracks at the time of track-laying.

Readers' Forum

Executives Should Show Greater Interest in Young Employees

Board of Supervising Engineers
Chicago Traction
Chicago, Ill., Jan. 30, 1929.

To the Editor:

In the Jan. 26 issue of Electric Railway Journal appeared an editorial entitled "Wanted—Young Blood." The argument there presented will apply to young men just starting in the electric railway business, whether in engineering or other departments. The statement is made that the industry has failed to raise men of the type desired. This condition seems unnecessary and inexcusable. The young man needs first, more than anything else, a little kindly consideration from some one well up the scale in authority. If interested in the railway business he is willing to work in any department to obtain necessary experience. Naturally, however, he wishes to feel that he is being observed and that if his work is satisfactory he will be guided into that department where he can make the best use of his ability and be most valuable to the company.

It is all very well to say that ability will bring the man to the front in spite of adverse conditions, but granting this, it is sometimes a long and discouraging route, tending to dull the keen enthusiasm and interest of the young man in his work. Personal interest in the work of the young man need not be wholly an unselfish attitude on the part of the company executives, because the enthusiasm and loyalty of youth may be capitalized for the benefit of the company as well as to the advantage of the man. Failure to make efficient use of the personnel of an organization is more important and far-reaching than a failure to use properly the material assets of the company.

Consideration of the young man will not in any way lessen his obligations to perform his full service to the company. The right kind of man does not want undeserved consideration to be shown him but does crave opportunity to do an advancing grade of work and to secure increasing compensation.

Another point touched upon in your editorial is the resistance to receiving suggestions from a younger or subordinate employee. No doubt those of us who are older have received many suggestions from our assistants, some usable, some not. But in any case a suggestion should be made welcome and initiative should not be stiffled by overriding or ignoring ideas by mere weight of authority. After all the relation of employer and employee, especially the younger inexperienced ones, should be largely governed by the Golden Rule. This rule is frequently strained to the breaking point, but in the main it is a good guide. Ralph H. Rice,

Principal Assistant Engineer.

Midwest Railway Men Discuss Fares and Claims

Executives attending meeting at St. Joseph, Mo., protest against tendency to deny the industry compensatory rates

THAT electric railways are entitled to a just and reasonable compensation for service rendered, based upon its cost plus a fair return to the investors, was the sense of a resolution adopted by the Midwest Electric Railway Association, meeting at St. Joseph, Mo., on Feb. 7-8. The delegates listened to a number of addresses wherein the speakers pointed out the discrepancy between present fares and the cost of producing the service, and the failure of the general public to appreciate the fact that this was having a serious effect upon credit and service, and the resolution was presented in the hope of securing recognition of this situation.

President F. G. Buffe of the association, calling the opening session to order on Thursday morning, introduced J. N. Shannahan, president Omaha & Council Bluffs Street Railway and chairman of the Advisory Council A.E.R.A. Mr. Shannahan said: "Given time, the pendulum swings both ways. I am just as well convinced the electric railway has a future as that I am standing before you. That future depends, of course, on the capability, tact and executive ability of our managements. The success or failure of the enterprise, whether it be hotel, bank, store or electric railway, depends on the personality of that individual."

The electric railway industry must learn that the value of an article is not based on its cost of production, but on what the public is willing to pay for it, declared Walter Jackson, fare and motor bus consultant, Mount Vernon, N. Y. "If we analyze our market," he continued, "we will find that our case is far from hopeless. Let us appreciate that we must not and cannot rest upon any assumed necessity for mass transportation. The fact that the community will suffer if we depart is about as convincing to the average public as the ant's warning to the grasshopper to save up supplies for the winter. To those who live within reasonable reach of our facilities, any handicap of waiting time should be offset by a manifest, not an asserted, economy. We are not going to get anywhere with our desire for more business and a better load factor until we appreciate that even the casual rider needs some incentive to use the street car." The chief incentive, in Mr. Jackson's opinion, is the combination of short-haul fares and short headways.

In our larger urban centers, according to William B. Bennett, director of research St. Louis Public Service Company, the street railway remains the only effective agency for the handling of real mass transportation. Even in cities where subways and elevated railroads are necessary and imminent, the surface railways will continue of increasing indispensability as feeders to bring people to the rapid transit arteries, in short-haul service, and in carrying people between points not conveniently connected by rapid transit lines.

"From the very beginning of skyrocketing of prices of all other commodities, the price of urban street railway transportation has lagged lamentably," continued Mr. Bennett. True, many companies foresaw the rapid upward trend in operating costs and made application to properly constituted authorities for relief, only to be caught in the slow grind of the law. But rare were the cases where even the demanded increases in fare were commensurate with the increased costs already experienced.

Nothing is quite so obvious, declared Robert B. Campbell, president and general manager Arkansas Valley Interurban Railway, as the futility of a fixed standard of service requirements or the prices to be charged for the service. While some may hold the opinion that the decrease in interurban passenger receipts has been due to the gradual increase in fares, Mr. Campbell disagrees, charging the decline almost entirely to the use of the privately owned automobile, aggravated in some cases by the bus. Declining passenger revenues was likewise the subject for observations by Robert P. Woods, president Kansas City, Clay County & St. Joseph Railway, who agreed substantially with Mr. Campbell. Mr. Woods emphasized the need for giving thought to both quantity and quality of interurban service, including character of equipment, time of operation and speed.

Discussing the factors involved in securing public good will and employee co-operation, C. D. Porter, vice-president and general manager Omaha & Council Bluffs Street Railway, in a paper which in his absence was read by F. S. Welty, assistant general manager, reviewed some of the difficulties which in December, 1927, confronted the new management in Omaha. An expiring franchise, a maturing bond issue with no means of refinancing, and a public relations dilemma have been succeeded in fourteen months of concentrated rebuilding by a new 30-year franchise voted by the outstanding majority of four to one, an extended bond maturity date, and a manifestly "friendly" public.

Development in city and interurban equipment was the subject of a paper by Charles O. Birney, superintendent of car construction Stone & Webster, Inc. "Our next ten cars to be built will in all probability be equipped with dynamic brake equipment or propeller shaft air brake with automatic release in connection with an internal expansion brake. While street railway officials actually purchase the passenger equipment," continued Mr. Birney, "the ride, which is the most important item, is purchased by the individual and it is his or her taste and convenience that must be considered."

The joint session on Friday morning with the Midwest Claim Agents Association was featured by two papers on the legal aspects of electric railway operation. Both H. S. Robertson, president Denver Tramway, and H. C. White, district claims attorney Illinois Terminal Railroad, stressed the desirability of close co-operation between legal and operating departments of a railway company. Both agreed that there are certain types of accidents in connection with which transportation department officials should understand the applicable legal principles, if for no other reason than to be able to explain to the individuals involved the reasons an adjustment was made.

Two roundtable luncheons Thursday noon provided both city and interurban operators an opportunity to exchange information concerning their common problems. Robert P. Woods presided over the interurban group; Charles A. Semrod, vice-president and general manager St. Joseph Railway, Light, Heat & Power Company, guided the street railway section.

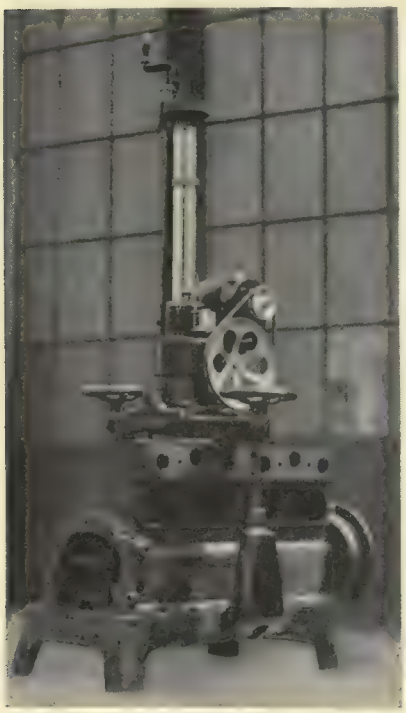
The banquet speaker was Earl W. Hodges, director of personal relations Henry L. Doherty & Company. St. Louis was selected for the June meeting.

PRACTICAL IDEAS *for the* Mainten

New Cylinder Boring Machine Pays for Itself in Ten Months*

By C. B. Hall
Chief Clerk Mechanical Department
Virginia Electric & Power Company,
Norfolk, Va.

GRATIFYING economies have resulted at the Norfolk shop of the Virginia Electric & Power Company, from the use of a new cylinder boring machine from the Storm Manufacturing Company, Inc., Minneapolis, Minn. Prior to the installation of this machine, work of reconditioning bus and engine cylinders was given to outside contractors. The cost of this work averaged from $30 to $45 per job. This work is now being done with the new equipment at a saving of $7 per job, and with the amount of work now necessary the cost of the machine will be saved in less than ten months.



New cylinder boring machine in operation in the shops of the Virginia Electric & Power Company

The accompanying illustration shows the machine set up for reboring the cylinders. Following this boring process a special hone outfit is used. The average time consumed for a first class job is nine hours, four hours of this being for the boring, and five hours for dressing up the cylinders with the hone.

*Submitted in Electric Railway Journal Prize Contest.

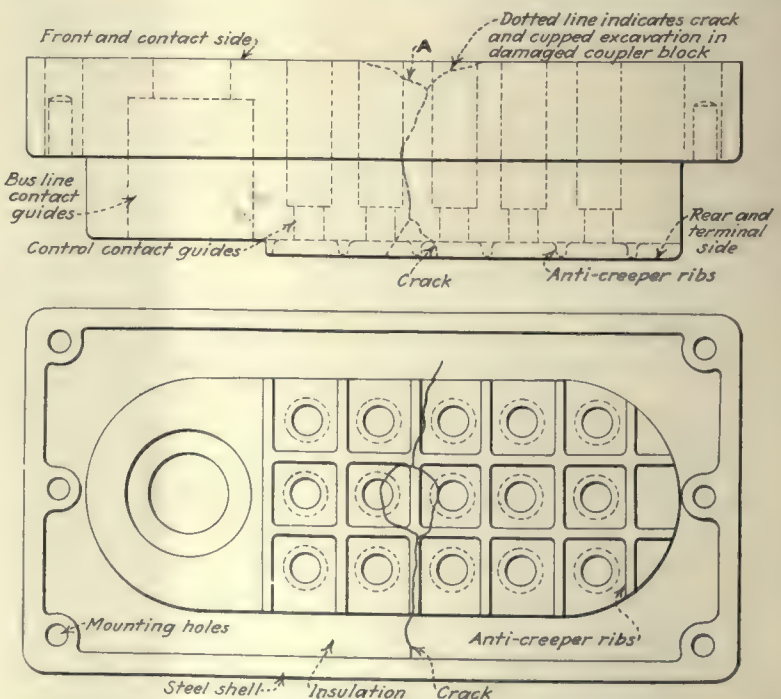
Sulphur Used to Repair Coupler Contact Blocks*

By Charles Herms
General Foreman
San Diego Electric Railway,
San Diego, Cal.

CONTACT blocks, used with Tomlinson automatic couplers on cars of the San Diego Electric Railway, are subjected to considerable damage from collisions with other vehicles and carelessness in making couplings. As a result, the contact blocks, which are made of molded insulation, are often cracked and have parts chipped out. As these blocks are quite expensive to replace, efforts have been made to devise a satisfactory method of repair. One has now been found which works out satisfactorily.

Where pieces of the insulation are chipped out, the surface is scraped out first to remove all loose particles, care being used to leave the surface rough. Hot sulphur is then worked into the hole by using a hot soldering iron. One of approximately 1-lb. weight has been found to work best. It is necessary to work the iron vigorously against the insulation to make sure that the sulphur combines with the insulation. Sulphur is melted off of a large block and ironed into the hole until it is filled. The sulphur cannot be melted in a ladle and then poured into the hole as it will not combine readily with the insulation, and this is an important part of the operation.

In performing the work, it is advisable for the workmen to be under a flue or suction fan as the sulphur fumes are annoying and often dangerous. After the hole has been filled in, the block is heated in an oven to 100 deg. C. and is then dipped in Westinghouse No. 335 varnish. After dipping, the contact blocks are again baked for 24 hours to make certain



Method of reclaiming damaged coupler contact blocks

ance Man

that they are dried out properly. Contacts are cleaned carefully with gasoline to make certain that all varnish is removed. The dipping seals up all cracks and prevents accumulation of moisture. This method of repair has resulted in about 150 per cent saving in the maintenance of these couplers.

Lathe Wheel Grinder

TROUBLE was experienced with the wheel-turning process in the shop of the Richmond Railways, Staten Island, N. Y., due to the fact that very often hard spots were encountered which could not be removed readily with ordinary turning tools. This caused considerable delay and a loss of production. It was



Removal of hard spots from wheels by means of grinding has decreased the cost of wheel turning and increased turning production

finally overcome by the design and construction of the grinding equipment, as shown in the accompanying photograph.

A 12-in. emery wheel is directly-connected to a motor and permanently mounted on an oak plank ¾ in. thick, 16 in. wide and 27 in. long. Two 1x2-in. conical brackets 21 in. long at the base and 12 in. wide at the top are bolted to two oak timbers 1½ in. thick by 6 in. wide by 21 in. long and spaced 21-in. centers.

The motor and emery-wheel base are provided with two slots located at 21-in. centers. These slots are ¾ in. wide by 7 in. long. The case is bolted to the brackets through these slots. This provides for movement of the emery wheel to and from the wheel being turned. A ⅛x2-in. angle is riveted across the top front of the two brackets and a ½x4-in. angle is bolted to the under surface of the base.

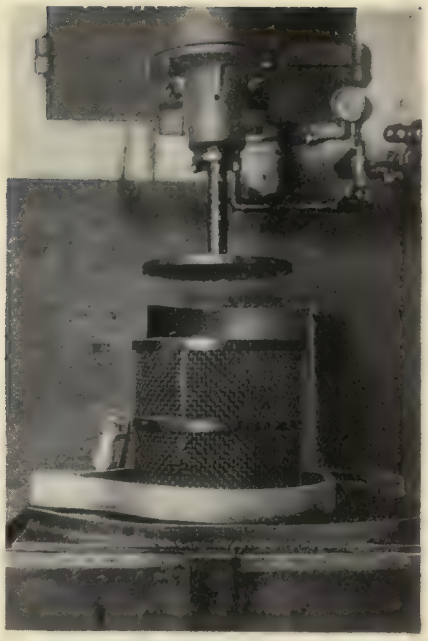
The ⅛-in. angle is provided with a $\frac{21}{32}$-in. hole and the ½-in. angle with a lever drilled and tapped for a ⅝-in. screw. A ⅝-in. screw with an offset handle 15½ in. long over all and with 8 in. of thread is passed through the $\frac{21}{32}$-in. hole and screwed into the tapped hole. Two ⅝-in. collars fastened to the screw on either side of the ⅛-in. angle hold the screw in a fixed position.

The equipment is mounted on a platform in back of the lathe in line with the wheel being turned. Longitudinal motion of the emery wheel is obtained by moving the entire outfit, whereas the lateral motion is secured by shifting the wheelbase in the brackets by means of the screw.

Pneumatic Waste Press

SPECIAL equipment to press excess oil out of armature and journal bearing waste after it has been saturated in a temperature-controlled waste tank has been devised in the Clifton Shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. This equipment consists of the pneumatic press, a wire waste container, an iron tray and a ½-in. flat plate.

The pneumatic press is made up of a 10-in. brake cylinder supported by substantial brackets fastened to the wall. The usual push rod and sleeve is replaced by a stuffing box, together with a solid piston to which is fastened a ½-in. plate, 14 in. in



Press for forcing excess oil from waste

diameter. The brake cylinder is provided with the necessary air piping, gage, safety and operating valves. A wire basket 15½ in. high and 15 in. in diameter is installed directly under the ½-in. piston plate and is made of ⅛-in. wire, ⅜-in. mesh, and held in shape by three circular bands made from ⅜x1-in. material. The basket rests upon a galvanized iron tray made of $\frac{7}{32}$-in. material. It is 2¾ in. high, 24 in. in diameter and is provided with a drainage spout 5 in. long. This spout has a 4-in. opening. The basket and tray rest upon a ½x48-in. iron plate supported by the sides of the waste box. A semi-circular shield, 18 in. high and with a radius of 7½ in., installed between the basket and the wall, and a ⅜x1½-in. circular metallic strip welded to the ½-in. plate on either side of the tray, prevent the oil from splashing over the wall and the tray overflow from running to the floor.

When the basket is filled with the saturated waste and air is applied to the cylinder the piston moves downward so that the piston plate presses the oil from the waste. The oil flows back into the tank through the spout of the tray. The amount of waste prepared at any one time is only sufficient to meet the immediate requirements.

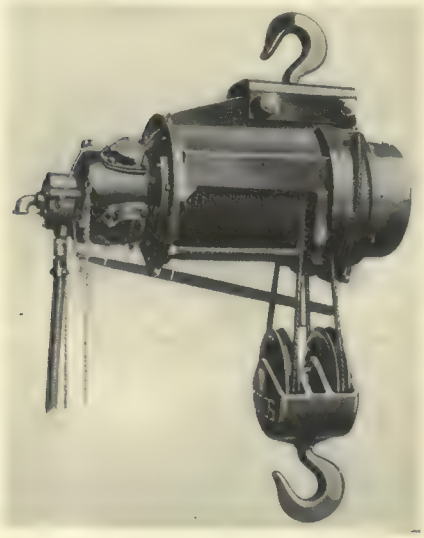
This equipment provides waste with the proper saturation, and no trouble has been experienced with hot bearings from improper saturation since it has been in service, it is reported. The device is easy to operate and saves much time in this phase of the regular maintenance work.

Helpful Equipment from the Manufacturers

Air Motor Hoist of 10-Ton Capacity

FOR handling wheels at lathes and presses in railway shops, and for other heavy lifting work which would ordinarily tie up a crane, a new air motor hoist of 20,000 lb. capacity is now being furnished by the Ingersoll-Rand Company, New York, N. Y.

The hoist construction employs a powerful four-cylinder air motor



New hoist for railway work

geared to a rope drum and all inclosed in a compact and dirtproof housing. The gears are made of special steel and are heat-treated to insure extra strength and wearing quality. They operate in a bath of semi-fluid grease, completely inclosed. Ball bearings or bronze bushings are provided at all points where experience has indicated that they will add to the efficiency and life of the hoist.

An automatic brake, of similar design to that used in other Ingersoll-Rand air hoists, is incorporated in this new size. This safety brake automatically holds the load at any desired position for any length of time, regardless of air pressure. Instant and complete control of the hoist movement is obtained by a graduated throttle and a well-balanced motor. The latter is practically without vibration. The cylinders are renewable and interchangeable, making it easy and inexpensive to renew the cylinders if worn after long service.

The hoist can be furnished with either a top hook or a chain-driven trolley as standard. The company is prepared, if necessary, to build special trolleys to meet customers' requirements.

PRINCIPAL DETAILS OF AIR MOTOR HOIST

Capacity, in pounds	20,000
Maximum lift, feet	16
Diameter of cable, inches	⅞
Length of cable, feet	83
Size pipe connection, inches	¾
Weight equipped with top hook, pounds	1,300
Weight equipped with chain-driven trolley, pounds	1,800

Water Tight Motor

A WATER tight motor has been developed for a Western firm by Roth Brothers & Company, Chicago, Ill. It is rated 15 hp., 1,150 r.p.m., 30 min. duty, and is compound wound for direct current. The motor is reversible and is used for hoist duty.

The bracket on the commutator end has four hand hole covers, removal of which permits access to the brushes, brush rigging and commutator. These covers are bolted on and are fitted with rubber gaskets, so that a stream of water can be played on the bracket without danger of any getting into the motor.

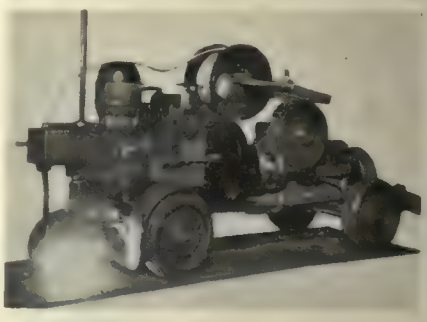
Floodlight Projectors With Improved Features

TWO improved floodlights for lighting railroad yards are announced by the Westinghouse Electric & Manufacturing Company. Both projectors have narrow beams, reflectors and heat-resisting clear lenses. The reflectors are of chromium-plated brass, spun over metal forms, assuring a high degree of accuracy and perfect beam control. The reflector surface, being chromium, is impervious to any form of corrosion or tarnishing and retains its brilliant polish permanently. The projector body is made of cast aluminum and is, therefore, quite light in weight and not subject to corrosion.

The floodlighting projectors have three thumb screws for focusing to a high degree of accuracy. A center screw adjusts the vertical position of the filament, a rear screw the focal distance, and a side screw the lateral position of the filament. All three screws work independently of each other and their adjustment is simple and rapid.

Automatic Tractor-Type Welder

AN AUTOMATIC, tractor-type arc-welder, utilizing the electronic tornado principle and used for making lap and butt welds on large surfaces, has been placed on the market by the Lincoln Electric Company,



Making a seam weld with tractor-type welder

Cleveland, Ohio. It consists of an electronic tornado head mounted on a self propelled four wheel-drive carriage. Power is supplied through a flexible cable and all that is necessary is to line up the machine over the section to be welded and to start the arc. The electrode and fibrous autogenizer are fed automatically as the tractor travels forward.

In making lap welds with this machine no additional filler metal is used. The heat of the carbon arc fuses the edge of the top plate into the lower plate, making a leak-proof joint. A filler strip is laid over the seam to be welded, when a butt weld is desired.

Advantages claimed for this machine are high welding speeds and smooth uniform welds. Speeds on ¼-in. lap joints varying from 50 to 75 ft. per hour are obtained.

News of the Industry

Detroiters Will Vote on Subway Proposal

Voters of Detroit, Mich., will decide on April 1 whether they want the subway system proposed by the Rapid Transit Commission. Decision to this effect follows a City Council meeting when eight of the nine members voted to submit the issue to the electorate.

The plan calls for the construction of one all sub-surface and elevated line running from the Ford motor plant on the River Rouge across the city and terminating at Connors and Mack Avenues. Although a portion of this line would be elevated, through the main section of Detroit all of it would be underground. Downtown loading stations and dips and a short subway for street cars in Woodward Avenue would also be required. This proposed tube system was submitted by the Rapid Transit Commission and the Board of Street Railway Commissioners following six years of study.

Another Step Toward Co-ordination in Grand Rapids

Another step has been taken in the proposed plan of the City Commission of Grand Rapids, Mich., to assist the Grand Rapids Railroad by municipal subsidizing or by grouping of all local common carrier transportation service under the control of the railway. To this end the tentative report of Gerald J. Wagner, municipal consulting engineer, regarding the augmented transportation system, has been accepted by the commission. This action affords the railroad an opportunity to offer plans to enhance its service, obtain larger revenues and reduce private automobile congestion in the downtown or business district.

Traffic Expert for Baltimore

Announcement has been made that a traffic expert of outstanding national repute will be added to the executive staff of the United Railways & Electric Company, Baltimore, Md.

Special Paper for St. Louis Readers

A newspaper of pamphlet size to be read by street car patrons as they ride was launched recently by the St. Louis Public Service Company, St. Louis, Mo. A contest is being conducted to find a suitable name for the new publication, the first prize being $50. In its pages will appear briefly told news of current interest, civic events, stories about places to go and things to see in St. Louis, with occasional announcements of company improvements and changes.

Unexpected Turn in Akron Negotiations

Resolution adopted for competitive bids from outside companies. Company had sought 10-cent fare

COMPETITIVE bids for the city transportation in Akron, Ohio, are to be asked following the adoption of a resolution by the City Council on Feb. 19, instructing the public utility committee of Council to advertise for bids from other companies for the business. The Council appropriated $100 for the utility committee to use in advertising, and in attempting to secure transportation companies of other cities to bid for the franchise.

This action of the Council came somewhat as a surprise as negotiations between the company and the city had been progressing. The company had asked for a 10-cent cash fare, eight tickets for 50 cents, with a 5-cent school ticket and a $1.50 weekly pass. The public utility committee of the Council had made a counter proposition, offering the company an 8-cent cash fare, seven tickets for 50 cents, with a 5-cent school ticket and the $1.50 weekly pass. The company had refused the city's proposal, and the city had asked the company to submit a new one when the matter came up at the Feb. 19 Council meeting.

Following a statement by the president of the Council in which he said that, "we are headed for a deadlock on the traction franchise and as there is no harm in looking ahead to the possibility of being unable to reach an agreement with the Northern Ohio Power & Light Company, and it is entirely proper to ask for bids from other concerns to operate the transportation system in Akron," Council unanimously adopted the resolution providing for the advertising.

One member of the Council talked against the resolution, but voted for it. He declared that in his opinion Akron would not get any outside bids for service. Other members of the Council found flaws in the proposal, saying that they did not want a duplication of the situation which existed five years ago. At that time the company's franchise had expired and the administration attempted to motorize the city. The attempt failed, and the street railway was granted an increase in fare. Following this, a new franchise was written and submitted to a referendum. The franchise gave the company a 50 per cent increase in fare, and was approved by the public by an overwhelming majority. Another member of the Council declared that the thing for the Council to do was to demand that the company continue the present fare for a year and then let the city take over the lines. They could be operated as the water works were operated. However, there was no demand for municipal ownership.

Accident in Hudson River Tube

A rush-hour train, loaded with 900 passengers became stalled in the Hudson Tunnel west of the Christopher Street station in New York City at about 6:10 o'clock on the evening of Feb. 19, due to a roadbed fire and a short circuit.

The office of the general manager of the Hudson & Manhattan Railroad, operating between New York and New Jersey under the Hudson River, issued the following statement:

At 6:15 o'clock a short circuit occurred in the power cable underneath a car on a train bound for Hoboken. The train was 1,000 ft. beyond Christopher Street station, under Morton Street, not under the river. Power was immediately cut off from the third rail and fans were started. The passengers on the train were unloaded and walked back to Christopher Street. There was an exit close by, but it was more convenient to walk to the station.

This was not really a fire. There was a flash and smoke from insulation. The cable was the one which runs back from the motorman's cab. Everything under these trains is steel and there was nothing to catch on fire.

Passengers affected by smoke and needing hospital treatment were removed to such institutions.

The day following the accident the New York Transit Commission issued a statement which read in part:

The train had proceeded about 1,000 ft. south of Christopher Street station at signal No. 142Z, when motorman noticed a fire in the roadbed and intended to pass over this when his brakes went into emergency, bringing the train to a sudden stop with the fifth car No. 455 and the motor truck of car No. 353 directly over the burning roadbed.

The motorman started to go through the train to investigate this emergency stop as he realized that the train was over the burning roadbed, and after resetting the emergency valve, which had been pulled, he proceeded to the head end of the train. By this time power was taken off the third rail due to circuit breakers in the substation kicking out at 6:02 p.m. caused by a short circuit in the power cable under car No. 455 of the above train.

The commission found:

1. A short circuit in the main power junction box under car 455, which probably was the cause of one of the train crew pulling the conductor's emergency cord, realizing that the train was about to enter the river tunnel.

2. The fire in the roadbed and motorman unable to move the train from the fire due to power being off third rail.

The state body ascribed the probable cause of the short circuit in the junction box of car 455 as possibly due to a loose connection on the connectors, as the interior and half of this metal box were burnt away, thereby destroying any positive evidence. The commission said:

The origin of the fire on the roadbed has not been determined, up to the present writing, but could have been caused by sparks from brakeshoes or a lighted cigarette being discarded to the roadbed. A preliminary inspection showed a number of ties and emergency foot walks burnt on the roadbed over a distance of about 60 ft.

San Francisco Plans for Operation of Cable Line

Tentative plans for the city's operation of the lines of the California Street Cable Railway, San Francisco, Cal., have been submitted to the Board of Supervisors. The franchise expires on Feb. 17, but, according to Supervisor Warren Shannon, chairman of the public utilities committee, negotiations to agree upon a price for taking over the lines have failed to bring results.

Mr. Shannon submitted a resume report of a survey of the cable lines, made by City Engineer M. M. O'Shaughnessy, together with a report on the franchise problem from City Attorney John J. O'Toole, acting under a resolution adopted last fall.

While expressing a hope that the public utilities committee, acting with the city attorney and city engineer, may be able to reach an agreement with the company prior to Feb. 17, when the franchises expire, Mr. Shannon had no suggestions to make as to what arrangement shall be made for the operation of the cable lines after Feb. 17.

Four plans for operation are outlined in Mr. O'Shaughnessy's report. According to the city engineer's estimates, only one gives a chance for avoiding losses in operation. It is estimated that it will give $12,650 annual profit, not allowing for amortization of bonds.

The city's estimates place $604,463 as the price that it can pay for the cable lines. If this is carried out, a bond issue of $499,911, to pay the cost of the new construction and make changes in the power plant at California and Hyde Streets, will be necessary.

The report shows that the replacement cost of the California Street lines would be $2,252,458 with the present depreciated value set at $1,097,404. As the city will not take over all of the company's property, the city's experts place the depreciated value of the property to be taken over at $903,000.

The report was referred to the public utilities committee, which will immediately start negotiations looking to a final agreement with the California Street Cable Railway.

Tax Plan Opposed

Proposal at Seattle to exact levy for benefit of Municipal Railway opposed. Situation reviewed

PROVISION to levy a tax, not exceeding 2½ mills, in 1930 and 1931 for aid of the Municipal Street Railway, Seattle, Wash., is contained in an ordinance, passed unanimously by the City Council for submission to a vote of the people at the municipal election on March 12. The measure has the backing of Mayor Frank Edwards, who said:

Consent of the public to a levy of this kind is what we need to tide the railway department over the next two years, after which the system may begin to enjoy the more permanent but slower benefits from the comprehensive program of betterment submitted by the Transit Research Commission.

Little Improvement in Finances Likely

He pointed out that the finances of the railway will be in worse condition next year than right now, when the bond interest and payments of the railway will reach a still higher peak.

Meanwhile the loan arranged by the City Council from the water department to aid the railway in meeting its $1,100,000 payment of principal and interest, due the Stone & Webster interests on March 1 on purchase bonds, has been under rigorous probe by state examiners. Just here again, J. G. Von Herberg, local theater magnate, who has been battling courts for more than a year to have operating expenses of the municipal railway take precedence over bond payments, has secured a temporary order from Presiding Judge Adam Beeler restraining Harry W. Carroll, city comptroller, and E. L. Terry, city treasurer, from making any payment on railway purchase bonds, principal or interest, until the suit is settled. He charges the City Council with "aiding and abetting" the Puget Sound Power & Light Company by loaning money from other funds to meet these payments.

In an affidavit, Von Herberg declares that the railway had on hand in cash on Jan. 1, 1929, only $264,000 and said that receipts during the month would not be more than $75,000 over and above operating expenses. To meet the crisis, he alleged, the City Council by "subterfuge" and in "secret meetings" loaned $800,000 from the water fund to which $484,000 had first been loaned from the general fund.

Right of City Challenged

State Examiner Leslie Hopkins, who has been investigating the loan transaction, challenges the right of city officials to loan general bond funds, voted for specific purposes, to other projects. He declared that "purchasers of these bonds undoubtedly have a legal right to restrain dispersion of funds raised by the bonds."

The railway still owes the city light department $100,000 from a loan of $600,000 made early last year. The state examiners found that the general bond fund, from which the Council indirectly loaned $484,000 to the railway, was created for the purpose of constructing the Garfield Street Bridge, the new fire department headquarters building at Second Avenue and Main Street, the new fire station in the University District and other municipal projects.

Preferences to Be Determined in Hampton

The Virginia Public Service Company has applied for permission to abandon railway service for one week on its East Hampton line in the city of Hampton and to substitute bus service, with a view to determining which is preferable. Hearing is scheduled for March 2.

Newspapers Tell Louisville Story

In an effort to acquaint the public with some of its problems the Louisville Railway, Louisville, Ky., is running a series of articles or statements in the daily papers, explaining its request for an increased fare rate. The company is asking for a cash fare of 10 cents, with some concession in the way of tokens or tickets.

In the fourth of the series of informatory advertisements, a list of 251 cities is given in which schedules are in effect with a single cash fare of 10 cents, but in which tickets or tokens for less than 10 cents are in effect. Letters favorable and unfavorable are appearing in the local papers.

More Than 80 Per Cent One-Man Service in Providence

Matters have reached a point where the United Electric Railways, Providence, R. I., feels it can no longer delay the institution of the one-man service on the Atwells-Academy Avenue line.

In regard to this line the Board of Aldermen of the city of Providence on Nov. 17, 1927, passed a resolution using language identical with a recent order and in response thereto the company postponed action. Nothing, however, was ever done by the City Council in that case following the postponement of the inauguration of the service.

At the present time United Electric Railways operates 81 per cent one-man cars and all cars in the city of Pawtucket and city of Woonsocket are operated by one man.

The attitude of the company is that operation on these lines disproves the suggestion set forth in the above resolution and it is important to note that four one-way trips are now being operated daily on the Atwells-Academy Avenue line by one man and during the Christmas week, 1928, sixteen one-way trips were operated over this very line by a single operator.

Boston Program Chances

Financial commentator believes them to be good, but is not over sanguine—Public ownership on installment plan

IN THE opinion of that conservative commentator on events, the Boston News Bureau, the bill reported into the legislature by the special commission appointed to study the Boston Elevated problem has a better chance of passing the legislature than any similar measure previously reported to that body. It would continue public control of the road.

This does not necessarily mean, however, that the measure will pass. Skepticism is found in many quarters. The reason for the optimism over this year's bill is that it is really an artfully drawn compromise measure. It is drawn to win the advocates of return of the road to private management and those who are eager for complete government ownership. In fact, the very artfulness of the measure has caused certain opponents to hint that diplomacy was one of the principal weapons used by its framers.

The bill has been described as a public ownership bill on the installment plan in that after 50 years of operation, as provided for in the measure, seven-eighths of the road belongs to a specially drafted district, which is in reality the state. The state, if it then desires, could purchase the other one-eighth and operate the road under public ownership. Here, indeed, is bait for the public ownership advocates who immediately ask, "Why, if we are given near public ownership, are we not given out-and-out public ownership?" "Because," replies the bill makers, "complete public ownership is too big a bite to bite off for one chew."

Then the advocates of returning the road to private control are given a sop by a provision that eventually a fair-minded purchaser can obtain the road.

Under the proposed measure the Elevated would acquire the Chelsea division of the Eastern Massachusetts. Chelsea and Revere would obtain a 10-cent fare. Naturally those districts, which have long suffered from a double fare to Boston are jubilant and naturally every legislator from Chelsea and Revere is working might and main for the measure and promising his vote.

Under the measure great rapid transit improvements are to be made in the metropolitan district and the cost of these rapid transit improvements is to be met in part by the car rider and in part by the general taxpayer. It would seem that Arlington, Brookline, Hyde Park, etc., would resent being assessed for betterments, not placed directly in their districts. But these districts, which do not benefit directly, are being told that the various sections of Boston must adopt the cry of The Three Musketeers, "all for one, one for all."

In other words, what helps Revere directly, helps Arlington indirectly, and what helps Chelsea directly, helps Brookline indirectly. Apparently, the metropolitan district, as a whole, is accepting this "all for one, one for all" argument, as protests from Arlington and Brookline have been rather feeble.

The other side to the picture shows what difficulties the bill may meet in the House. Incidentally, no difficulties are expected in the Senate. There is a public ownership group in the House. If this group declines to accept this partial public ownership bill, it will hurl its votes against passage. There is also a return to private ownership group, which may employ the same tactics; say little and vote "anti."

Then there is a group of newcomers in the House, about 100 strong, to whom the Elevated question and Elevated finances are about as clear as the bottom of a cider jug. Not the least depressing feature is that most of this latter group take no more interest in Metropolitan Boston transportation problems than they do in transportation problems of Vienna, Paris or Tokyo.

In brief, says the News Bureau, the special commission has really drawn the most generally satisfactory Elevated public control bill yet presented to the legislature. If a few of the die-hards of public ownership and private control will support the measure, it will be enacted into law.

Exonerated in Ohio Accident

Principals in the collision of a Lake Shore Electric interurban car and a Greyhound bus near Bellevue, Ohio, on Jan. 22, in which nineteen lives were lost, have been absolved of criminal responsibility by Coroner C. L. Bell of Norwalk. Ten witnesses, including T. P. Schuyler, motorman of the interurban, and Edward Butler, driver of the bus, appeared at the hearing. The main difference in the testimony of Messrs. Schuyler and Butler concerned the degree of visibility.

Death Is Just Ahead of the Reckless



In the city of Detroit there has been erected a most terrifying reminder to motorists of the price individuals pay who disregard admonitions about being cautious. The accompanying illustration conveys a real idea of the efficacy of the warning. Incidentally, the traffic survey bureau of the Detroit Police Department reported on Jan. 31, 1929, the following record of casualties:

1927

One hundred and ninety-four vehicles hit protected safety zones, killing two people and injuring 263 riding in vehicles. There were 29 drunk drivers involved who killed one person and injured 39.

1928

One hundred and sixty vehicles hit protected safety zones, killing six people and injuring 208. There were 20 drunk drivers involved who injured 27 people.

1927

One hundred and forty-four vehicles ran through unprotected safety zones, killing nine persons and injuring 175. There were five drunk drivers involved who killed two persons and injured four.

1928

Two hundred and twenty-nine vehicles ran through unprotected safety zones, killing ten persons and injuring 268. There were thirteen drunk drivers involved who injured seventeen people.

1927

Eleven vehicles killed two persons and injured thirteen standing in protected safety zones. Drunk drivers not involved.

1928

Nineteen vehicles injured nineteen people standing in protected safety zones. Drunk drivers not involved.

1927

Eighty-nine vehicles struck protected type safety zones but did not injure occupants of vehicles. This involved nine drunk drivers and three drivers who were asleep.

1928

Eighty-nine vehicles struck protected type safety zones but did not injure occupants of vehicles. This involved nine drunk drivers and eight drivers who were asleep.

Power Needs Being Negotiated by Jersey Roads

It seems assured that the Delaware, Lackawanna & Western Railroad, in carrying out its electrification program, will purchase its current from the Public Service Electric & Gas Company, instead of building its own power plant, which was considered as an alternative. It also is disclosed that ultimate electrification is in prospect for the New York & Long Branch, the shore road, the right-of-way of which is used by the Pennsylvania and the Central Railroad of New Jersey.

According to the Newark *News,* these facts were developed when Thomas N. McCarter, president of Public Service, disclosed a few days ago that negotiations between his company and the Lackawanna for the furnishing of power for the electrification are near completion.

Mr. McCarter also stated negotiations are continuing with the Pennsylvania Railroad for the latter's electrification in New Jersey. In past announcements by the Lackawanna regarding electrification, it was stated, the railroad was undecided whether to buy Public Service current or have its own generating plant. It is understood negotiations with both railroads have been on the basis of a cost plus plan.

Present plans for the Pennsylvania would call for the Public Service to furnish the current for electrification between the Hudson and the Delaware Rivers. Then the current would be furnished by the Philadelphia Electric Company. In Maryland, the Baltimore company would supply the energy to Washington.

Under the tentative plans, the railroad intends to electrify between Philadelphia and Trenton before extending the electrification through New Jersey. The New York & Long Branch Railroad, operated by the Pennsylvania, would be electrified last.

Systematic Planning Proposed for New York City

Edward M. Bassett, city planning expert, recommends the creation of a city planning board with unusual powers to prepare a "master plan" for New York City, to establish change of building zones and to select desirable places for bridges, parks and playgrounds, routes of railroads, buses and ferries and locations of sewers, water conduits and other public utilities.

Can't Afford New Gray Garb in St. Louis

Platform men of the St. Louis Public Service Company, St. Louis, Mo., have announced they will not wear the new gray uniforms the company has asked them to don on Easter Day unless they are granted an increase in pay.

The 1,500 men voted unanimously to reject the uniforms, it is said, as a protest against the delay of the Missouri Public Service Commission in reaching a decision in the wage controversy with the company.

The company has posted bulletins requesting the men to appear in the new uniforms on Easter Day. The uniforms would cost slightly more than $35 compared with a price range of $27 to $35 for the blue serge uniforms now worn. M. J. Douglas, president of the St. Louis Amalgamated, said that under the present wage scale it would work a real hardship on some to compel them to buy new uniforms by March 31.

Hearing on Indianapolis Wage to Be Held

A motion of the Indianapolis Street Railway, Indianapolis, Ind., to have a petition of its employees for increased wages dismissed has been denied by the Indiana Public Service Commission. Hearing on the wage petition will be held later by the commission. Another motion filed by the company seeking to strike out complaints against unnamed company officials was approved.

Cincinnati's City Manager in Charge of Rapid Transit

Colonel Sherrill, City Manager at Cincinnati, Ohio, has assumed formal control of the rapid transit and the Central Parkway, made necessary by the dissolution of the Rapid Transit Commission on Dec. 31.

His first act was to retain all fourteen employees of the commission. The engineer of highways, Frank Shipley, will assume charge of all work necessary to the completion of the rapid transit and the parkway. Work on boulevard lighting, traffic control system and all other utility matters will be under the supervision of Edgar Dow Gilman, director of public utilities. Traffic markers will be under the control of Grover C. Smith, safety secretary, while the beautification of the parkway will be in the hands of the Park Board. The study of all problems relating to the use of the rapid transit will be continued by Mr. Gilman in conference with the City Manager.

Forceful Message Reiterated for Staten Island Riders

The Richmond Railways, Inc., Staten Island, N. Y., has been running as a car "ad" the opinion of the New York *World* on Mr. Whalen's views on transit. This comment appeared in the *World* of Dec. 29, 1928. It has been referred to previously in these pages. Richmond Railways states that it is in full agreement with the *World;* that no transportation medium has yet been devised for surface operation to replace the trolley car in mass transportation.

Another interesting car "ad" entitled "1929 Resolution" gives reason No. 1 for riding on the company's lines, namely: safety, health and comfort.

Freight Stimulating An Iowa Interurban

The protective committee of Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., for first mortgage bondholders, of which E. V. Kane is chairman, has sent a letter to the first mortgage bondholders in which it says:

The results of the operation of the Waterloo, Cedar Falls & Northern Railway for the calendar year 1928 further justify the waiting policy of the protective committee. Gross earnings for 1928 were the largest in the company's history, showing a gain over 1927 of more than 14 per cent, and of more than 35 per cent over those of 1925. The increase was entirely from freight. Passenger traffic, owing to automobile competition, continues to show a loss.

Rapid Transit Between Los Angeles and Glendale

Members of the Chamber of Commerce at Glendale, Cal., were told recently that rapid transit facilities for Glendale will be increased by construction mapped out by the Pacific Electric Railway engineers between Glendale and Los Angeles.

Plans have been completed by Pacific Electric officials and are said now to be awaiting approval of the financial officers of the company in New York. They call for extension of the present railway tunnel, which runs from the Hill street station in Los Angeles to Glendale Boulevard and First Street.

The financing would be by bond issue covering San Fernando valley and the work when finished would be turned over to the railroad. The cost is placed at $10,000,000. Bus lines as feeders of the proposed railway are part of the project.

Another Honor for William E. Wood

William E. Wood, president of the Virginia Electric & Power Company, Richmond, Va., was elected vice-president of the Richmond Chamber of Commerce at the recent annual meeting of that body. Mr. Wood was formerly a member of the board of directors, in which capacity he took an active part in the city welfare. He was recently the chamber's guest of honor at a banquet held to commemorate the railway's achievement in winning the Coffin Award.

Buffalo Railway Man Honored

Walter McCausland, director of public relations for the International Railway and the International Bus Corporation, of Buffalo, N. Y., has been elected a member of the board of directors of the Greater Buffalo Advertising Club. He has been an active member of the club since going to Buffalo from Philadelphia several years ago.

Enlargement of Commission's Statutory Powers Asked

In its annual report to the Legislature the Public Service Commission of New York asks for a considerable enlargement of its statutory powers. It desires a more clearly defined authority over bus companies and asks that airplanes serving as common carriers be brought within its jurisdiction. It also seeks an extension of its control over utility holding companies, asking that such companies be required to make full and regular reports and that it be empowered to investigate into all relations between them and their affiliated companies, as well as into the profits of non-utility companies from materials or services supplied them by public service corporations. It would have this extension of its jurisdiction apply not only to companies exercising control through stock ownership, but also through leases and operating contracts.

Committee Still Considering Jacksonville Grant

The special committee appointed by Perry Atkins, president of the City Council of Jacksonville, Fla., to report on provisions for a new franchise for the Jacksonville Traction Company is still considering various phases of the proposed new franchise. It will report to the Council only when a definite agreement is reached. It is not expected that the report and recommendations will be ready for adoption by the Council and presentation to the voters of the city by the time of the first primary election on April 16. The committee is considering drafts of proposed franchises for the company submitted by Peter O. Knight, Tampa, general counsel for Stone & Webster, operators of the company, and the Jacksonville citizens committee.

Municipal Ownership Plan Before Minneapolis Committee

The City Council of Minneapolis, Minn., after recently deciding not to contest the fare increase to the Twin City Rapid Transit Company, has now referred to the street car committee of the City Council a proposal that a vote be taken on a plan for municipal ownership at the city election to be held in the spring.

Bill to Control Pedestrian Traffic in Wisconsin

Control of pedestrian traffic at automatic signal corners, the same as the automobiles are now directed, and elimination of all unstable and unsafe vehicles that complicate traffic conditions on highways, will be provided for in a uniform motor vehicle code to be presented to the Legislature of Wisconsin. The revised code is designed by C. N. Mauer, traffic engineer of the state highway commission, and conforms to the new Hoover motor vehicle code adopted in almost a score of states.

Mr. Mauer and S. J. Williams, the head of the public safety division of the National Safety Council, conferred with traffic experts at Milwaukee on Jan. 24, among them W. E. Knoelk, chairman of the Milwaukee safety commission; Dr. B. L. Corbett, secretary; Walter J. Mattison, assistant city attorney; R. H. Pinkley, vice-president of The Milwaukee Electric Railway & Light Company; Capt. Albert J. Murray, head of the police traffic bureau; Assistant-Chief E. F. Hackett of the fire prevention bureau, and Edward Callaway, W. F. Ardern and Howard Ilgner of the safety commission.

Paving Relief Measure Offered in New York

Bearing the name of Senator Warren T. Thayer of Franklin County, chairman of the public service committee of the upper house, a bill designed to relieve street railways of some of their paving charges has been presented to the Legislature with the announcement it would be pressed for passage. The bill provides that a company shall restore only that pavement disturbed by it in the construction, reconstruction or repairs of its tracks to the same condition as before the disturbance. This would relieve a corporation of the duty of repairing pavement disturbed through natural wear and tear and weathering.

Traffic Holding Up in British Columbia

TRAFFIC on the lines of the British Columbia Electric Railway, Vancouver, B. C., has held its own in spite of the rapid increase in automobiles. Contrary to developments in the United States, Canadian street railways in general are showing increases in traffic which are puzzling traffic students. Vancouver, according to the statistics, has more automobiles per capita than the other large cities of Canada, and this condition is raising problems of traffic congestion which must be solved if the public is to be carried swiftly and economically to its destination.

There is no question of the necessity of the street car in the community, yet the minority using automobiles can so impede the progress of street cars as to make their operation difficult at the speed which people now demand. And if people further forsake the street car in favor of the individual vehicle, they join the vicious circle which increases congestion to themselves and others.

From this it will be seen that no longer can the public utility assume that it has no competition.—*Canadian Financial Post.*

Bill Against One-Man Cars

Many measures introduced in Missouri which would affect electric railways. Rapid Transit for St. Louis

FOLLOWING the introduction into the present session of the Missouri Legislature of a bill which would make two-man street car operation compulsory in the state, the public utilities committee of the Chamber of Commerce of Kansas City went on record as approving the one-man car idea. The committee's opinion was that the Kansas City Public Service Company was confronted with enough problems at the present time without requiring it to meet the demands of an order of this kind.

If the directors of the Chamber of Commerce approve the action of the committee, the chamber will probably wage a fight at Jefferson City against the bill.

According to Powell C. Groner, president of the Kansas City Public Service Company, a return to two-men operation would necessitate the employment of about 800 additional operators with a total annual salary of $1,500,000. Alteration costs would be an additional $750,000.

The bill was introduced by William Hicks, a representative from the county in which Kansas City is located. It would affect St. Louis as well, although only a few one-man cars are operated in that city.

About $750,000 was spent in making the changes in Kansas City cars necessary to convert them to one-man operation.

Several bills, intended to clear the way for a rapid transit system in St. Louis, Mo., were presented to the Missouri General Assembly at Jefferson City on Feb. 4. They were prepared by the St. Louis Rapid Transit Survey Commission. One would amend the constitution to permit cities of the first class to issue public utility bonds to finance rapid transit systems on a 50-year term basis instead of the present limit of twenty years.

Another measure is an enabling act authorizing the city to establish, construct, own and operate rapid transit improvement, either subways or elevated lines, to issue bonds to finance such projects and to condemn lands and assess benefits against real property for such improvements.

E. J. Russell, chairman of the City Plan Commission at St. Louis, Mo., and of the St. Louis Rapid Transit Survey Commission; R. F. Kelker of Chicago, consulting engineer for the transit commission; and City Counselor Muench on Feb. 14 recommended to the judiciary committee of the Missouri House of Representatives at Jefferson City the passage of a bill that would sanction for the public utilities in the state, exclusive of telephone companies, indeterminate permits instead of fixed period franchises. It is regarded as more than likely that the committee will report favorably on the measure.

Experimental Period for Seven-Cent Fares on California Line

Effective Feb. 1, 1929, for an experimental period of six months, the California Railroad Commission authorized the Southern Pacific Company to establish a 7-cent fare between the Broadmoor-Dutton Avenue districts and the business district of Oakland, and a one-way fare of 28 cents to San Francisco. The present fare from and to the Oakland business district is 14 cents, and from and to San Francisco 32 cents.

A reduction of $1.50 in the commutation fares applicable between the East Bay points and Oakland Pier was also authorized.

Illumination for Cars Discussed

All forms of lighting of interest to electric railways are being studied by special rolling stock committee No. 4. This includes cars, buses, shops, and yards. Many interesting developments were discussed at the meeting of the committee held at association headquarters, New York, on Feb. 4. Those present were R. W. Cost, chairman; A. L. Broe, L. T. Colman, A. C. Dick, E. E. Dorting, W. S. Hadaway and H. A. Otis. In reviewing last year's report of the committee, with the idea of incorporating new information this year, there was considerable discussion of what should be considered as adequate illumination of cars. The present tendency appears to be to increase illumination over what was considered necessary a few years ago.

In discussing the illumination of signs for cars and buses, it developed that the width of letters in relation to their height, and the spacing of letters, played a very important part in the legibility of the signs. Also, where lights are placed too close to the sign a spotty effect makes reading difficult.

In discussing headlights for cars, it was considered desirable to floodlight the ends of cars. The newly developed headlight which provides for this will be considered by the committee. Proposed recommendations for motor coach lighting were discussed.

Ideal Equipment an Object of Sub-committee's Program

Believing that revenue rather than maintenance should be the governing factor in the design of new rolling stock, and that the operating man, rather than the master mechanic, should have the first word in the matter of car design, if the comfort and the convenience of the passenger are to receive the consideration to which he is entitled, a subcommittee of the committee on "The Equipment," meeting at association headquarters, New York City, on Feb. 14, decided to plan its program with these ends in view. At the outset the committee will recognize the following general tendencies:

1. Higher speeds, acceleration and deceleration, and free running speeds are necessary, and any recommendations made will conform to this principle.
2. Economic necessity indicates a trend toward one-man operation with single-end control.
3. Greater comfort and cenvenience for the passenger, as well as greater comfort and convenience for the operator, must be held uppermost in any recommendations.
4. There is a need for more than one class, quality and price of service.

The scope of the committee will include the layout of an ideal city-type car and bus, considering appearance, comfort and convenience, and the investigation proposes to subdivide the subject further into consideration of the exterior appearance, the interior appearance, fixtures and fittings, signs, and matters having to do with acceleration, deceleration and noise reduction.

The meeting in New York was attended by W. T. Rossell, chairman, Adrian Hughes, George Frey, J. F. Craig, J. C. Thirlwall, A. R. Barclay representing L. H. Palmer, R. J. Bennett, C. H. Strong and J. W. Welch.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***March 1*—Metropolitan Section, American Electric Railway Association, 33 W. 39th St., New York, N. Y.**

***March 12-14*—Oklahoma Utilities Association, annual meeting, Oklahoma City, Okla.**

***March 14-15*—Illinois Electric Railway Association, Hotel Abraham Lincoln, Springfield, Ill.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***May 13-15*—National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

***May 15*—Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***June 27-28*—Central Electric Railway Association, Michigan City, Ind.**

***Aug. 15-16*—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Foreign News

New Tramway Under Construction in Italy

Construction of an electric tramway from Marina di Pisa to Pisa, Italy, was authorized recently by the Italian government. This line will connect with a tram line now under construction which is to extend from Leghorn to Marina di Pisa. Pisa and Leghorn will be within one-half hour by tram when the line is completed. It is expected that the undertaking will greatly increase the traffic between the two cities.

Argentine Company Passes to American & Foreign Power

The American & Foreign Power Company, a subsidiary of the Electric Bond & Share Company, has made its entry into the public utility industry of Argentina through an agreement just concluded with the Atlas Light & Power Company, Ltd., of England, for the purchase of all that company's holdings in electric supply and electric railways operating in Argentina. The purchase price of £8,500,000, or $42,500,000, is payable by instalments in cash, according to the reports, and, in addition, the sum of £850,000, or $4,250,000, has been paid as a deposit to cover the revenue balance. The Atlas company has utility holdings in Uruguay, but its holdings outside of Argentina will be retained.

Proposed Express Tramway in Manchester

Recommendation has been made to the City Council of Manchester, England, by the tramways committee to construct a sleeper-laid tramway track for a service of express tramcars, extending 6 miles from the Manchester Town Hall to the border of Wythenshawe.

New Electric Railway in Spain

Service was installed on a new electric railway in Alicante, Spain, on Aug. 15, 1928. This line extends from the business section of Alicante to the San Blas Ward, a distance of about 2 miles. The ordinary fare from the city to the end of the line is about 3 cents, but for 20 pesetas (about 4 cents) one may travel in the first-class section and enjoy a rattan spring seat instead of a wooden seat. Although Alicante has a population of about 75,000, all street car lines are single track, and in traveling only short distances considerable time is lost by waits at turn-outs.

This, however, is only one of a number of similar Spanish projects. Between the town and railway station at Guadix, Spain, a new electric tramway is approaching completion. Application has been made for a concession to construct an electric tramway in the town of Sanabria, province of Zamora.

Recent Bus Developments

Commission's Bus Order in Chicago Reversed

In a decision handed down on Feb. 14, Judge Otto Kerner, of the Cook County Circuit Court, reversed the Illinois Commerce Commission's order of last September, denying the Chicago Surface Lines permission to operate feeder buses on the northwest side of Chicago. The decision follows one of several weeks ago, when Judge Kerner declared invalid the commission's order authorizing the Chicago Motor Coach Company to operate its buses in the same territory in which the surface lines had asked permission to establish feeder bus service. Attorneys for the motor coach company announced that they will appeal from Judge Kerner's ruling, and will continue to operate the 34 miles of bus extensions established with the commission's approval on Oct. 3 of last year.

A large number of residents of the northwest side, testifying at the original hearing, had demanded feeder bus service operated by the Chicago Surface Lines to connect with existing street car lines, thus giving the patrons service to the downtown district at a single 7-cent fare. The motor coach concern, on the other hand, had proposed to furnish service at a flat 10-cent rate.

Judge Kerner held valid the original order of the state commission in January, 1928, finding the public convenience and necessity required additional transit facilities in the neighborhoods adjacent to Belmont and Diversey Avenues, and that the most practical way to provide this needed service was by operation of buses as feeders to the street car lines on those two streets as a part of the system of the Chicago Railways.

In his first decision last month, Judge Kerner ruled that the commission had entered its order approving the motor coach company's application without giving due notice of the hearings to the surface lines. In entering an order of this kind, the commission, therefore, had exceeded its authority, he said.

Test Case by Michigan Commission

The Michigan Public Utilities Commission has ordered the United Freight Forwarding Company and the Star Transfer Line, Grand Rapids, to discontinue their motor truck freight service from Grand Rapids to Grand Haven and to Muskegon, cities formerly served by the Grand Rapids, Grand Haven & Muskegon interurban, which abandoned business a year ago. By this move the commission hopes to determine its right to control the highways and traffic of the state of Michigan. The commission regards as a subterfuge the claim of the carriers that they were contract carriers and could operate without a permit.

Expansion Planned in Jamestown

The Jamestown Motor Bus Transportation Company, subsidiary of the Jamestown Street Railway, Jamestown, N. Y., has applied for a certificate of public convenience to operate a line between Jamestown and Frewsburg, a one-way distance of 5½ miles. Service would begin with three buses, maintaining fifteen-minute service during the greater part of the day, with additional vehicles to be placed in operation during the morning and evening rush hours. This is the second extension of facilities of the Jamestown Motor Bus Transportation Company within a few months, a line from Jamestown to Greenhurst having been opened a few weeks ago.

Higher Fare in Massachusetts

An increase in fares on the buses of the Milford, Framingham & Uxbridge Coach Company in Massachusetts has been put into effect. The company operates a line between Framingham and Uxbridge, passing through Milford and Hopedale. When the coach service supplanted the railway on July 3, the fares on the buses were slightly reduced from the trolley rates as the officials of the line believed there would be an increase in riding. Because of lack of patronage, however, an increased rate must be charged between Hopedale and Uxbridge and Milford and Framingham. The same 10-cent rate will exist between Milford and Hopedale, a ride of about 2 miles.

The new fare schedule will be similar to the fare that was charged on the railway, excepting for the Milford-Hopedale zone the rate will be 13 cents or two zones for 25 cents. General Manager Adams says the 25 cents will be charged between Milford and Holliston and 50 cents between Milford and Framingham. The present fare is 20 cents from Milford to Holliston and 40 cents to Framingham. Traveling west the fare is 25 cents between Hopedale and Uxbridge.

The interests that own the Milford, Framingham & Uxbridge Coach Company own the Milford-Hopedale railway. The future of the railway between the company's east Main Street carhouse and the Draper Corporation plant is open to conjecture. Recently the Selectmen of Milford conducted a public hearing on the matter of revoking the location of rails of the railway in Milford. If the railway did not accept the Selectmen's decision within 30 days, it was provided that the matter would go to the state department of public utilities.

Two Miles of Abandoned St. Louis Line to Have Buses

The Missouri Public Service Commission has authorized the St. Louis Public Service Company to abandon its Vandeventer Street car line for a distance of 2.5 miles. A provision stipulated by the commission is that when the tracks are taken up the company must substitute adequate bus service at a rate not to exceed that charged on the street cars and with transfer privileges for passengers to all intersecting railway lines. The city of St. Louis interposed no objection provided buses were substituted.

Service by Bus to Ford's Los Angeles Plant Favored

Operation of a motor coach line by the Pacific Electric Railway between Los Angeles and Wilmington to provide a service for employees of the proposed Ford plant, the Goodyear, Firestone and Samson tire plants and Pan-American Petroleum company's industries has been approved by the Los Angeles Board of Public Utilities. That body decided that, while there is a slight paralleling of transportation systems because the route is near the Pacific Electric's service to Wilmington, there is certain public convenience and necessity to be served. It will recommend to the California Railway Commission that the application be approved, particularly as the territory is growing as an industrial section.

The proposed fare is 35 cents between terminals, 60 cents for the round trip and 5 cents between local points.

Taxi a Menace in Rochester

President James F. Hamilton of the New York State Railways operating in Rochester, Syracuse, Utica and Schenectady declared on Feb. 13 that unless city authorities in Rochester or the Public Service Commission step to the front and put an end to what he says is illegal operation of taxicabs he will go to the courts and apply for an injunction. Mr. Hamilton says the companies are violating the old jitney law which fixed 16½ cents per passenger as the minimum rate which may be charged by taxicabs or other vehicles not operating on a fixed schedule and routes. The taxicab companies deny they are operating as jitneys.

Substitution of Bus Denied in Sacramento

Members of the City Council, Sacramento, Cal., have upheld the contention of the people residing in the territory served by the G and H Street railway line of the Pacific Gas & Electric Company and denied the application of that company for franchises for bus lines, one of which had been planned to replace the electric railway.

Financial *and* Corporate

Segregation Ahead for Annapolis Line

Nelson, Cook & Company, Baltimore bankers, in discussing the affairs of the Washington, Baltimore & Annapolis Electric Railroad, say it once more becomes feasible to assume that the railroad end of this property will be permitted to pass (not without adequate compensation) into the hands of some consolidated railroad system. That necessarily means full protection for the first mortgage bondholders which will assure them a more stable market position for their bonds. Under this reopened aspect the bankers reiterate the idea of the former theory that the railroads' 5 per cent bonds may eventually be redeemed at the call price, 105 and interest, so that the railway portion of the property may be segregated and separated from the light and power end.

Contral of a majority of the stock of the railroad is lodged with the Consolidated Gas, Electric Light & Power Company, Baltimore. Among the holdings of the railroad is the stock of the Annapolis & Chesapeake Bay Power Company.

Loan of Funds in Seattle Approved

Recent action of the Seattle, Wash., City Council in loaning general obligation bond funds to the city water fund, so that the latter might assist the Seattle Municipal Street Railway in meeting its annual instalment due on the purchase bonds, has been approved in an opinion issued at Olympia by E. W. Anderson, assistant attorney-general. The opinion was rendered to C. W. Clausen, state auditor, as the result of a question as to the legality of the Council's proceedings which was raised by state checkers working at the City Hall. Mr. Anderson sustained Corporation Counsel T. J. L. Kennedy in his advice to the Council that making of temporary loans from one city fund to another would be legal, provided that the "borrowing" fund is solvent. Despite the long series of financial difficulties, city officials declare that the Seattle railway system is still solvent.

Rights for Holders of Engineers Public Service

The Engineers Public Service Company has authorized the sale of about 200,000 shares of additional common stock to its stockholders at $42.50 a share. Common and $5.50 cumulative preferred stockholders will receive rights to subscribe for one new common share for each ten shares held, and convertible preferred stockholders will receive rights to buy one and one-half common shares for each ten shares held. Option warrant holders will receive rights to buy one common share for each twenty warrants held, all rights applicable to holders of record Feb. 14. The proceeds of the issue are to be used for further investment in the company's subsidiaries, thus supplying a part of their 1929 construction requirements.

$108,989 Balance in Grand Rapids

Gross earnings and traffic show decrease. Considerable reconstruction work accomplished. Good results of safety educational methods

DUE largely to unfavorable industrial conditions which affected employment in some of the large factories and to the increasing use of privately owned automobiles, 4.86 per cent fewer revenue passengers were carried by the Grand Rapids Railroad, Grand Rapids, Mich., in 1928 than in the preceding year. This statement was made in the annual report to the stockholders for the year ended Dec. 31, 1928. Gross earnings consequently were adversely affected, but steps taken to effect operating economies resulted in savings which partially offset the decline in earnings. While gross earnings for the year decreased $101,181, gross income decreased only $53,284 due to savings in operation.

No change was made in the rates of fare during 1928, and based upon this schedule, the company was entitled to earn a return of 7¾ per cent on the value of its property, after deduction of operating expenses, taxes and provision for retirement reserve. The company's earnings in 1928, available for such return, were $108,795 less than those allowed by the franchise.

COMPARATIVE STATEMENT GRAND RAPIDS RAILROAD

	1928	1927
Gross earnings:		
Passenger revenue	$1,551,679	$1,627,157
Revenue from special cars	1,012	1,893
Rent of equipment and tracks	18,678	44,375
Non-operating revenue	2,801	1,925
Total	$1,574,170	$1,675,351
Operating expenses and taxes:		
Operating expenses	$957,624	$1,005,642
Taxes	133,617	133,495
Total	$1,091,241	$1,139,138
Gross income	$482,929	$536,213
Interest on funded debt	236,274	
Interest on unfunded debt	4,640	
Total	$240,914	
Net income	$242,014	
Dividends on preferred stock	10,276	
Provision for retirements	122,748	
Balance	$108,989	
		Per Cent
Ratio of operating expenses to gross earnings		60.83
Ratio of operating expenses and taxes to gross earnings		69.32
Revenue passengers carried		17,483,996

During 1928 $179,762 was expended for additions and betterments to the property. This included the reconstruction of double track and the construction of single track, and the remodeling of twelve single-truck, one-man operated cars.

No important changes were made during the year in bus service. Buses are being operated on five different routes in various sections of the city supplementing the car service.

No public financing was done by the company during the year. Capital expenditures were made from earnings and from retirement reserve. The equity of the stockholders was further increased by the retirement through sinking fund obligations of $95,000 in principal amount of first mortgage sinking fund 7 per cent bonds due May 1, 1939. In this connection a total of $412,000 in principal amount of this issue has been retired since the bonds were offered to the public in May, 1924.

The group life insurance plan, started by the company in 1926, was continued during 1928 and on Dec. 31 a total of 370 employees was insured, without cost to them, for $479,200.

In conjunction with other organizations in the city, the Grand Rapids Railroad continued its work in promoting public safety and 1928 was another year of excellent results. Many employees were enrolled in the safety council's classes and in addition, educational material in the shops and carhouses was supplemented with personal instruction by the company's welfare director. Expenditures in connection with injuries and damages were only 0.93 per cent of the gross transportation revenue.

The report goes into some detail on the problem of traffic congestion in certain business sections, and refers at length to the comprehensive report submitted by Gerald J. Wagner, city consulting engineer, to the City Commission. The Grand Rapids Railroad is now making a careful study of this report for the purpose of ascertaining just what it properly can do along the lines of the proposals made.

The accompanying statement covers operations for 1928 and 1927, in which is included figures for the eight months following organization of the present company, and for the first four months of 1927 which cover operation by the preceding company.

Preferred Stock in Settlement of Mill Tax in St. Louis

An ordinance, authorizing the Board of Estimate and Apportionment to sell 16,000 shares of the St. Louis Public Service Company's 7 per cent preferred stock, accepted by the city in settlement of its mill tax claim against the United Railways, was passed on Jan. 25 by the Board of Aldermen. The minimum price fixed for the stock was $80 a share. The Board of Estimate and Apportionment several weeks ago offered all or part of its stock for sale in lots

of not less than 400 shares, but received only one bid for 400 shares at $83.

Aldermen Eilers and Wimer said the city made a mistake in accepting the stock in lieu of cash, but President Nuen replied that in his opinion the Board of Estimate and Apportionment will eventually realize $500,000 more through the stock than if it had taken the cash offer.

$46,286 Under Tucker Grant

Under the provisions of the Tucker grant the Connecticut Company has sent the city of Hartford, Conn., a check for $46,286, which is 2 per cent of $2,314,317, the gross fares collected during 1928, within the city limits of Hartford. Recently the Tucker grant was under discussion and was taken before the courts, where its validity was upheld by the Supreme Court.

FARES RECEIVED AND TAXES PAID IN HARTFORD

Year	Receipts	Tucker Grant Tax
1923	$2,470,880	$49,417
1924	2,494,614	49,892
1925	2,496,690	49,933
1926	2,509,426	50,188
1927	2,363,303	47,266
1928	2,314,317	46,286

Bus fares not included.

Directors of the Connecticut Company indicated a decrease in receipts from railway fares during 1928. A statement by officials shows that the gross fares in 1928 were approximately $50,000 less than in 1927, making the tax payment under the Tucker grant $1,000 less.

Orleans-Kenner Line Would Discontinue Part of Route

A. B. Paterson, president of the Orleans-Kenner Traction Company, New Orleans, La., declared at a recent hearing before the Public Service Commission that the company needed a revenue of $45,000 per mile a year to operate profitably, and was only receiving $6,000 a mile a year. He proposed that the line be abandoned beyond Orleans Parkway, 3 miles above the protection levee, leaving the traffic between Orleans Parkway and Kenner to the Teche Transfer Company, bus operators.

Mr. Paterson said that a fare of 10 cents would be charged from Orleans Parkway to Carrollton Avenue, with privilege of transfer to cars of the New Orleans Public Service. He promised a basic schedule of twenty minutes, with cars at ten-minute intervals during the rush hours. It was further proposed to allow the Teche Transfer Company to carry passengers between Kenner and Canal Street without picking up fares between Orleans Parkway and Canal Street.

Mr. Paterson stated that the New Orleans Public Service owned $55,000 of the interurban company's bonds, on which no interest had been paid since 1925, and was owed $24,000 additionally on open accounts. The New Orleans Public Service feels that it cannot bear the load any longer.

Mr. Feight said the Teche Company could easily handle all the passengers between Harahan and Kenner by bus. He suggested that his company could maintain an hourly schedule from Kenner into the city between 6 a. m. and 9 a. m., service every two hours up to 4 p. m., and hourly service again from 4 p. m. to 7 p. m. The fare would probably be 30 cents from Kenner, as compared with the present fare of 37 cents, and 20 cents from Harahan to Canal Street. Chairman Williams said that in the meantime he would take the case under advisement.

$131,369 Balance on New York State

The accompanying tables give the comparative summary of operations of the New York State Railways and a summary of operations of affiliated bus lines, submitted by James F. Hamilton, president, to the stockholders.

SUMMARY OF OPERATIONS OF NEW YORK STATE RAILWAYS—YEARS ENDED DEC. 31

	1928	1927
Railway operating revenues	$9,658,535	$9,879,150
Railway operating expenses	6,945,011	7,058,067
Net revenue railways operations	$2,713,523	$2,821,083
Taxes	583,732	596,565
Operating income	$2,129,791	$2,224,517
Non-operating income	31,665	122,955
Gross income	$2,161,456	$2,347,472
Deductions:		
Interest on bonds	1,286,177	1,290,294
Other interest and deductions	215,722	218,086
Total deductions	$1,501,899	$1,508,381
Net income	$659,556	$839,090
Appropriations:		
For sinking fund	28,187	30,525
For depreciation reserve	500,000	500,000
Total appropriations	528,187	530,525
Balance for dividends and surplus	$131,369	$308,565

SUMMARY OF OPERATIONS OF BUS LINES OF NEW YORK STATE RAILWAYS

	1928	1927
Gross revenues	$611,880	$601,362
Operating expenses	533,571	532,968
Net operating revenue	$78,308	$68,393
Taxes	15,825	13,129
Operating income	$62,483	$55,264
Deductions	15,763	18,613
Available for depreciation and surplus	$46,719	$36,650

Rumors on Resumption of Tacoma-Seattle Line

Past employees of the Puget Sound Electric Railway, operating the Tacoma-Seattle interurban in the state of Washington but discontinued since the first of the year, contemplate bidding in the line at the receiver's sale to be held on Feb. 25, and again placing it in operation, according to insistent reports from that city. O. O. Rutledge, Puyallup, who was employed by the company for twenty years, states that the project is under consideration, and the road's former employees are being canvassed at the present time. The reasons for the suspension have been reviewed previously.

Conspectus of Indexes for February, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Feb. 1929 7.75	Jan. 1929 7.71	Feb. 1928 7.50	Feb. 1929 7.75	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	Feb. 1929 145.0	Jan. 1929 145.3	Feb. 1928 139.5	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	Feb. 1929 229.9	Jan. 1929 229.9	Feb. 1928 228.7	Feb. 1929 229.9	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Feb. 1929 205.2	Jan. 1929 204.5	Feb. 1928 200.9	March 1924 206.8	Sept. 1927 199.4
Eng. News-Record Construction Cost (General) 1913 = 100	Feb. 1929 210.4	Jan. 1929 209.4	Feb. 1928 204.6	March 1924 224.7	Nov. 1927 202.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Jan. 1929 97.2	Dec. 1928 96.7	Jan. 1928 96.3	Nov. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	Feb. 1929 12.98	Jan. 1929 12.96	Feb. 1928 13.53	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Jan. 1929 154.6	Dec. 1928 155.8	Jan. 1928 155.1	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Jan. 1929 160.9	Dec. 1928 162.1	Jan. 1928 163.1	Nov. 1925 171.8	April 1928 160.8
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Jan. 1929 132.5	Dec. 1928 127.3	Jan. 1928 118.4	Nov. 1928 135.0	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	Jan. 1929 108.7	Dec. 1928 106.6	Jan. 1928 104.1	Jan. 1929 108.7	May 1924 84.4
Business Failures Number	Jan. 1929 2210	Dec. 1928 1672	Jan. 1928 2180	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	56.50	52.76	54.50	122.95	23.13

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Personal Items

J. F. Uffert Directs in Rochester, Syracuse and Utica

Appointment of John F. Uffert, superintendent of equipment of the New York State Railways, as general superintendent of transportation of the company's lines in Rochester, Syracuse and Utica, has been announced by President James F. Hamilton. Mr. Uffert, who retains his position as general superintendent of equipment, succeeds Roy R. Hadsell, Rochester, recently made general manager of the Schenectady Railway.

Starting his career when a boy of twelve in the shops of the then Newark Passenger Railway, now the Public



John F. Uffert

Service Railway, Mr. Uffert for 34 years has been an active figure in the electric railway industry. During his long experience in the industry he has worked in the East, Middle West and on the Pacific Coast.

From the various departments of the shops at Newark, he rose to the carhouse and later shop foreman. He was a motorman in New York City and for the Coney Island & Brooklyn Railway. After serving as inspector of equipment in New York, he became shop foreman for the Union Railway at New York and served in a similar capacity for the Atlantic City & Shore Line Railway at Atlantic City. Since then he served as master mechanic, West Chester, Pa., and Sanford, Pa.; foreman for the Detroit United Railway at Rochester, Mich.; for the Illinois Traction System at Decatur and for the Chicago City Railway; equipment inspector United Railways, San Francisco; master mechanic Tacoma Railway & Power Company and the Puget Sound Railway at Seattle and Tacoma; foreman Portland Railway & Light Company, Portland, Ore.; Cleveland Railway and the Bay State Railway, Brockton, Mass.; master mechanic Hudson Valley Railway, Glens Falls, N. Y., and the United Traction Company, Albany. After serving as general superintendent of the Albany system, Mr. Uffert went to Rochester in 1917, as general superintendent of equipment.

Mr. Uffert will retain his present headquarters in Rochester. His appointment, covering general supervision of the lines of the New York State Railways in the three cities of Rochester, Utica and Syracuse, besides retaining his post as superintendent of equipment, is regarded as a high tribute to his ability and his long experience.

Changes in Auditing Department at Fairmont

William G. Neiert, assistant for several years, was recently elevated to the position of auditor of the Monongahela-West Penn Public Service, Fairmont, W. Va. He succeeds J. R. McCartan, who resigned after a year's service. At the same time Charles E. Breckenridge, formerly divisional auditor, becomes assistant auditor, filling the vacancy created by Mr. Neiert's promotion.

Mr. Neiert has held several positions as an accountant, one of them with the railroad in Cincinnati. Since his affiliation with the Monongahela Valley Traction Company he has held several different positions in the auditing department.

Mr. Breckenridge went to the company after a varied experience. The Agricultural Implement Manufacturing Company in Toronto claimed his services for nine years. Later he affiliated himself with a firm of public accountants in Buffalo. From 1922 to 1925 Mr. Breckenridge was traveling auditor for the American Water Works & Electric Company, going to Fairmont in 1925.

Mr. McCartin left that company to become associated with Price, Waterhouse & Company, accountants for the American Water Works & Electric Company and the West Penn System, with which he was previously connected.

J. H. Henderson Appointment on Iowa Board Confirmed

The Iowa Senate has confirmed the appointment of J. H. Henderson as commerce counsel for the State Board of Railway Commissioners, the name being sent to the senate by the railway commission. Mr. Henderson has served nearly a year on the board in that position, having been appointed to fill the vacancy caused by the resignation of Dwight N. Lewis. His term will expire June 30, 1933.

F. J. Buckley, general manager Bury Corporation Tramways, England, has been appointed general manager and engineer of the Norwich Electric Tramway.

New Vice-President of Eastern Massachusetts

As successor to the post left vacant by R. B. Stearns, Albert J. Boardman, as vice-president and acting general manager of the Eastern Massachusetts Street Railway, Boston, Mass., has the advantage of a technical education supplemented by practical experience in problems of service and management. His promotion by the Board of Public Trustees was referred to in the Electric Railway Journal, issue of Feb. 16. Some months ago Mr. Boardman was advanced from the Brockton division to larger responsibilities at the general headquarters of the company in Boston. The next step was his advancing to the managerial post.

Mr. Boardman joined the Eastern Massachusetts Street Railway official force in 1919, a few months after the beginning of public control, and was



Albert J. Boardman

assigned as manager of the Fall River division. In 1921 he was promoted to the management of the Brockton district. Prior to his going to Boston to become connected with the system of the Eastern Massachusetts Street Railway he was connected with the Indianapolis Traction & Terminal Company as engineer and at one time was superintendent of transportation of the Terre Haute, Indianapolis & Eastern Traction Company.

Mr. Boardman is a graduate of Cornell University in mechanical engineering. During the World War he served overseas with the American Expeditionary Forces. One of the local newspapers correctly sensed the opinion of the men held in the railway industry when in its comment on his appointment it referred to his force, sound judgment and capacity to meet issues and stated that he was fitted to maintain sound public relations.

Walter L. Adams, who was superintendent of the Milford & Uxbridge Street Railway for many years, and more recently president of the Milford, Framingham, Hopedale, Uxbridge Street Railway has resigned this office. He is still general manager of the railway and bus lines.

West Penn Promotions

At a testimonial dinner in his honor in Connellsville, Pa., on Jan. 31, H. L. Mitchell surprised his well-wishers by the announcement of the selection of Daniel Durie as vice-president of the West Penn Railways. Mr. Mitchell had listened to the eulogy on his accomplishments in the nine years since 1920 when he went from vice-president of the West Penn Railways to his recent promotion as president of both the railway and power companies. Among the speakers was W. S. Finlay, president of the parent company, the West Penn Electric Company. Then it was Mr. Durie's turn to be surprised for the announcement of his advancement was unexpected.

Mr. Mitchell, in a quarter of a century, has gone through the ranks from a clerkship to the presidency of the West Penn Railways and West Penn Power Company. Entering the employ of the Pittsburgh, McKeesport & Connellsville Railway in 1902, he has occupied increasingly important positions in the West Penn System since that time. During the acquisition of the lines which now form the West Penn Railways system, Mr. Mitchell was located in Connellsville. He was transferred to Pittsburgh in 1911 as assistant to W. E. Moore, then vice-president and general manager. In 1918 he became assistant to Vice-President Williston Fish, and on Sept. 15, 1918, was elected vice-president and manager of the Wheeling Traction Company and transferred to Wheeling. On Feb. 1, 1919, he returned to Pittsburgh as general manager of the West Penn Railways, was elected vice-president March 1, 1920, and president April 14, 1927. On Jan. 9, 1929, he was elected president of the West Penn Power Company.

Dan Durie, since he came to the coke region in 1901 from New Jersey to take over the foremanship of the West Penn's shops, has been identified with the modern equipment of the West Penn and other progressive tendencies of the system. For a while he interested himself in transportation matters, but his inclination was for maintenance detail and after serving in the mechanical department he was made master mechanic of the entire system. From 1909 to 1913, additional properties were taken over and many cars different in type, and carhouses and shops ranging in size and in the nature of their equipment were added. In June, 1915, he became general superintendent of railway operation and in addition in 1917 he was made general superintendent of equipment.

On Sept. 27 when H. L. Mitchell announced two operating divisions, the Pennsylvania division was put in charge of Daniel Durie, who had been superintendent of what is known as Territory "A." Other than his service with the New Jersey system, Mr. Durie's entire career has been with the West Penn system. Mr. Durie served as president of the Engineering Association 1926-1927.



Herbert A. Wagner

Messrs. Wagner and Cohn with Washington-Baltimore Road

Herbert A. Wagner, president of the Consolidated Gas, Electric Light & Power Company, Baltimore, Md., has been elected president of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, filling the vacancy caused by the recent death of James J. Doyle. Mr. Doyle had been president for several years. At the same time Charles M. Cohn, vice-president of the Consolidated Gas, Electric Light & Power Company, was elected vice-president of the railroad. H. T. Connelly, who has been general manager of the railroad for some time, was also elected a vice-president. He will continue to fill the position of general manager. The Consolidated owns the majority of the stock of the Washington, Baltimore & Annapolis Electric Railroad.

Mr. Wagner began his business career in the electrical industry in the engineering department of the Westinghouse Electric in 1887. He represented that house in St. Louis in the organization of the Missouri Electric Light & Power Company, which undertook, under Mr. Wagner's supervision, the installation of the first incandescent electric lighting plant in St. Louis in 1889. Later, he became general superintendent Missouri Electric Light & Power and its successor, the Missouri Edison Company. Many features of the present-day alternating current distribution and transmission systems were first worked out in St. Louis and put into successful commercial operation there. The Wagner Electric Manufacturing Company was organized by Mr. Wagner, who was its first president. All his career he has been connected with the development of some of the largest electric light and power companies in the East. Mr. Wagner was graduated in engineering from the Stevens Institute of Technology in 1887.



Charles M. Cohn

Charles M. Cohn, the new vice-president of the Washington, Baltimore & Annapolis road, was elected president of the Industrial Corporation of Baltimore City in 1919. This is an enterprise which grew out of the Aldred Industrial Survey of Baltimore, and has assisted in the organizing and establishing in Baltimore of industries having an aggregate capitalization of more than $5,000,000 and employing more than 4,000 workers. This work, of course, was secondary to his duties as vice-president of the Consolidated Gas, Electric Light & Power Company, Baltimore. In 1906 he was secretary of that company, and for some time discharged the duties of general manager. Mr. Cohn is a graduate of Loyola College and an alumnus of the Baltimore University School of Law. He began his career in the gas department of the Consolidated company.

Appointments to California Commission

Arthur T. George has been appointed by the California Railroad Commission to succeed Carl I. Wheat, whose resignation became effective on Feb. 15. Mr. George has had the benefit of more than two years' experience in the legal department of the commission, having served as assistant attorney from 1925 to 1927. Since the latter date he has been engaged in the practice of law at Los Angeles with the well-known firm of Newlin & Ashburn. Prior to his appointment as assistant attorney for the commission in 1925, he was connected for two years with the County Counsel's office of Los Angeles County. He was co-author with Mr. Wheat of the volume entitled "Public Utility Regulation in California," published by the commission in 1927. Mr. George is a graduate of Stanford University and Harvard Law School.

The commission has also named Ira H. Rowell as its assistant attorney to succeed Reginald L. Vaughan, who has resigned to re-enter the private practice of law on March 1, 1929. Mr. Rowell has been connected with the commission since December, 1927, as an examiner. He was admitted to the bar in California in 1923, and practiced law from that time until his appointment as an examiner. He was graduated from Eureka College, Illinois, and studied law at Harvard Law School, the University of Chicago, and was graduated from the law school of the University of California. For a number of years he was connected with the business management of the Fresno *Republican*

Construction Projects Progressing

St. Louis Terminal Railway accepts authority to build subway. New York subway construction progresses. Track construction in Vancouver

FORMAL acceptance has been filed by the St. Louis Electric Terminal Railway with the city registrar, of a St. Louis ordinance granting the company authority to build a subway, elevated line and surface track to connect the McKinley Bridge with a new terminal to be erected at Twelfth Boulevard and Lucas Avenue. The St. Louis Electric Terminal Railway, which is a subsidiary of the Illinois Terminal System, Chicago, Ill., posted a $50,000 bond to assure the compliance with the terms of the ordinance.

On Feb. 9 a motion was granted to permit the three commissioners on the North Twelfth Boulevard widening project to file a partial report, covering the property condemned south of Cass Avenue and in the vicinity of the new terminal of the St. Louis Electric Terminal Railway. The motion was filed at the request of the board of public service to facilitate the construction of the railway subway. It is proposed to use the reinforced concrete roof of the subway as the foundation for the widened street.

New York Subway Construction

The Bronx Concourse subway extension in New York City, which will join the Manhattan Line at 148th Street and St. Nicholas Avenue, is progressing along St. Nicholas Place toward the vicinity of the Polo Grounds, where it will cross under the Harlem River and pass the Yankee Stadium, continuing on up under the concourse. Five contracts on the Bronx line have been awarded as far as Kingsbridge Road, amounting to approximately $28,000,000. The balance of the concourse line will be under contract during the present year, according to the authorities.

According to Mayor Walker of New York City, plans for the consummation of the entire program of the rapid transit development, involving an expenditure of $700,000,000, are being anticipated. It is expected to advance the work this year by at least $100,000,000 and that the end of 1929 will bring a solution of practically all the problems involved in this undertaking.

Work of reconstructing the Big Four Railroad Bridge at Louisville, over which the Louisville to Jefferson, Ind., interurban railway and the lines to Indianapolis will operate, is progressing. The bridge went out of service last summer and is being entirely rebuilt of heavier steel construction. Operation of the Belt Railway which connects all steam lines entering Oklahoma City will be started by the Oklahoma Railway under a ten-year lease on May 1. Three freight locomotives to handle the increased freight business of the company, when this line is taken over, are being constructed at a total cost of approximately $100,000.

Vancouver Improvements

A number of improvements are to be made on its lines by the British Columbia Electric Railway, Vancouver, B. C., in the near future. Approximately 1,400 ft. of double track will be laid on Alma Road, replacing the existing single track. Two thousand feet of track on Hastings Street, which is now under stringer construction, will be laid with slab and fill construction.

The North Vancouver City Council has under consideration a plan for the extension of this company's tracks to the ferry wharf at a cost of approximately $2,000. Traffic to this wharf was resumed Nov. 30, 1928, after the construction of the subway at the Esplanade, the railway connection with the bridge over the second narrows of Burrard Inlet.

The Toronto Transportation Commission and the Toronto City Board of Control, Toronto, Ont., have agreed on plans for the provision of electric service on Bathurst Street, south of the steam railway. Approximately ½ mile of double track will be built, probably after the new bridge is constructed over the steam railway tracks.

Material Purchases

Considerable track and line material has been purchased recently by the Pittsburgh Railways, Pittsburgh, Pa. Included in their orders are 10,000 ft. of No. 9 single-conductor cable, 2,000 ft. of No. 9 double-conductor cable, 2,000 ft. of No. 14 seven-conductor cable and 8,000 ft. of No. 14 single-conductor cable. Other line material ordered includes 25 4-in., four-pin, single-iron cross arms, 10 section insulators, 1,000 28-in. bonds, 1,000 40-in. bonds, 2,500 7-in. bonds, 600 10-in. pin bonds, 600 12-in. pin bonds, 70 trolley frogs, 30 5-in., four-pin, single-iron cross arms, 25 8-in., four-pin, single-iron cross arms and 40 miles of No. 00 round copper trolley wire.

Track materials ordered by this company include 10,000 oak ties, 10,000 tie plugs, 5,000 creosoted ties, 160 kegs of track bolts, 200 kegs of track spikes, 14 carloads of slag ballast and 3 carloads of ½-in. screening. Other materials ordered include one standard city catch basin, 10 No. 2 adjusting rods and 10 No. 1 adjusting rods, 200 slide plates, 200 braces, 20 switch point clips, 20 guide plates, 10 Century switch stands, and 500 pairs of 32-in. joint plates for 80-lb. T-rail.

The Tri-City Railway, Davenport, Iowa, has ordered one Mack four-cylinder, 29-passenger bus equipped with a suburban type body. The Cummings Car & Coach Company, Chicago, Ill., which purchases buses for the Chicago & West Towns Railway, Oak Park, Ill., has ordered one Mack four-cylinder, 29-passenger city type bus. The Pittsburgh Railways, Pittsburgh, Pa., has placed orders for six Yellow model W, 21-passenger parlor coaches, and the Springfield Street Railway, Springfield, Mass., has accepted three Mack 233-in. bus chassis.

Eight low-floor type, two-man cars are being remodeled by the Pittsburgh Railways for one-man operation. Four of these cars are the 4300 type and four of the 5000 type. This company has also ordered one set of rewinding material for a 10,000-volt, 1,420-hp., 60-cycle motor, and has ordered track circuit signaling equipment from the Union Switch & Signal Company for four blocks of signals on the interurban division.

The Chicago, Milwaukee & St. Paul Railroad is in the market for three 15-ton electric overhead cranes for Milwaukee. The Pacific Electric Railway, Los Angeles, Cal., plans a new power substation at Glendale, Cal.

Changes in Valentine & Company

At the annual meeting of the stockholders of Valentine & Company, held at the company's office, 386 Fourth Avenue, New York City, on Jan. 23, the following officers were elected:

N. T. Pulsifer, chairman of the executive committee. Mr. Pulsifer has been actively identified with the affairs of the company in executive capacities for many years, becoming vice-president in 1902, president in 1915, and chairman of the board of directors in 1922. He has had a long record of honorable achievement in the industry.

A. L. Phillips, chairman of the board, has been actively identified with Valentine & Company for the past 38 years. Mr. Phillips became cashier of this company on Jan. 1, 1890; was elected treasurer of the company in 1893; president in 1922; and became chairman of the board on Jan. 23, 1929.

Lawson Valentine Pulsifer, president, has devoted his entire business life to the interests of Valentine & Company,

starting as an assistant chemist in 1913. He represents the third generation to become chief executive of this company.

The other officers of the company, namely: O. A. Hasse, executive vice-president; Langdon B. Valentine, vice-president; Lawrence Phillips, vice-president and treasurer; L. H. Roper, assistant treasurer; and L. A. Osborne, secretary, are men of long experience in the industry. New plans and products have been developed for the expansion of the company's business.

Exhibit Committee Meets

Considerable progress was made at the first meeting of the exhibit committee held recently in Atlantic City, N. J. In reviewing the exhibit work accomplished thus far, it was pointed out that last July President Stevens appointed a special fact-finding subcommittee on convention location. The Cleveland proposal for 1929 was the same tendered for the 1928 convention. The committee, therefore, turned its attention to tentative proposals received from Atlantic City and held several meetings in both Atlantic City and New York, finally securing a contract from Atlantic City, basically comparable with previous contracts. This was submitted to and had the approval of the committee on convention location, which, in turn, recommended its acceptance by the executive committee. Under this contract all monies will be paid directly to the Atlantic City convention and publicity bureau, and, as the new Atlantic City Auditorium is municipally owned, the contract bears, in addition to the signatures of the bureau officers, those of both the Mayor and the general manager of the auditorium.

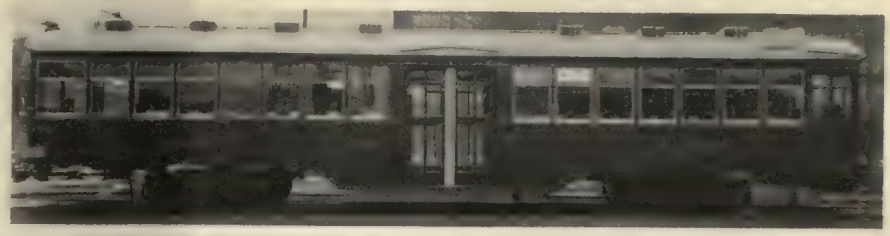
The contract for furniture and rugs will be handled by the local contractors, C. M. Koury Company, who are well known and whose prices have been brought into line with what has been paid for the past several years. The Knoble Brothers Company, who handled the floral requirements at Cleveland, presented a proposal for caring for the work in Atlantic City. However, it is felt desirable to retain J. J. Habermehl Sons Company, of Philadelphia, as they have handled this contract for the large conventions held in Atlantic City for a number of years. The Eldredge Express & Storage Warehouse Company, who have handled drayage at previous Atlantic City A.E.R.A. conventions will again receive this privilege, and the Atlantic City & Shore Railroad, through the courtesy of Vice-President Purinton, have agreed for a nominal figure to handle all exhibit display street cars of 50,000 lb. weight or under. The Robinson Supply Company, a local concern who handled the drinking water contract at the previous Atlantic City convention, will again do so this year. The Atlantic Foto Service will look after the convention photographic work as they have for many years.

The rules and regulations governing exhibits and under which the exhibits have been held for a number of years will be practically the same for this year's show. These have worked out very satisfactorily in the past and will only be changed to meet the new conditions.

The executive committee, at a meeting held in New York, Nov. 23, approved a budget which had previously received the consideration of the finance committee and the price of space for the 1929 show will be 60 cents per square foot. This is the same rate as charged for space at the 1928 show, there being no charge for track space to be used for street car display, either on the Convention Hall Plaza or on the existing tracks on Georgia and Mississippi Avenues. It is planned to send out space applications April 12. Thirty days will be allowed for filing of space requests as in the past. At the conclusion of that period, there will be another meeting of the exhibit committee for the purpose of making the official space allotment.

Minutes of a meeting of the special subcommittee of the exhibit committee.

Pacific Electric Cars Delivered



One of the all-steel cars recently delivered to the Pacific Electric Railway by the St. Louis Car Company

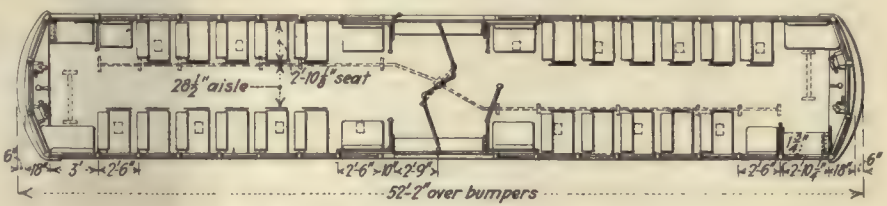
Ten two-man, motor-driven, city-type passenger cars were recently delivered to the Pacific Electric Railway, Los Angeles, Cal. These cars, manufactured by the St. Louis Car Company, St. Louis, Mo., are of the double-truck type. Each car weighs 55,800 lb., is 52 ft. 2 in. long, 8 ft. 11 in. wide and seats 65 passengers.

The cars are of the center entrance and exit, front exit type. The bodies are all-steel construction with arch-type steel roofs. The center doors are the sliding type with stationary steps, and the front doors are of the folding type with folding steps. The exterior is finished in dark red lacquer. Semi-individual, high back, leather upholstered, deep cushioned seats are used.



Deep cushioned leather upholstered seats are used

The trucks have a wheelbase of 6 ft. and are spaced on 29 ft. centers. They are equipped with roller journal bearings and 26-in. cast-iron wheels. Additional details are given in the accompanying specifications.



Floor plan of the Pacific Electric Cars

Weights: car body	27,466 lb.
Trucks	15,360 lb.
Equipment	12,974 lb.
Total	55,800 lb.
Bolster centers	29 ft.
Length over all	52 ft. 2 in.
Length over body posts	48 ft. 2 in.
Truck wheelbase	6 ft.
Width over all	8 ft. 11 in.
Height, rail to trolley base	10 ft. 9¼ in.
Window post spacing	30 in.
Body	All steel
Roof	Arch steel
Doors	Center sliding and end folding
Air brakes	Westinghouse
Axles	Pollak-heat treated
Car signal system	Faraday
Compressors	DH 16
Conduit	Metal
Couplers	Westinghouts air and electric
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote J86
Destination signs	Hunter
Door mechanism	Consolidated
Finish	Duco
Floor covering	Flexolith composition
Glass	Double strength AA
Hand brakes	Miner
Heat insulating material	Salamander and Flaxlinum
Headlights	Crouse Hinds
Headlining	Agasote
Journal bearings	Roller
Journal boxes	Hyatt
Lamp fixtures	Electric Service Supplies Company
Painting scheme	Dark red
Registers	Ohmer
Sash fixtures	Curtain Supply Company
Seats	Heywood-Wakefield 327-M
Seat spacing	30 in.
Seating material	Leather
Step treads	Feralun
Trolley	Eclipse
Trucks	St. Louis-Commonwealth
Ventilators	Automatic
Wheels, type	Griffin cast iron, 26 in. diameter
Wheelguards or fende s	Eclipse

appointed for the purpose of laying out floor plan (showing detailed space arrangement for the coming Convention) revealed that the ballroom on the second floor level would be used as the main meeting room for the sessions of the American Association in the mornings and that all entertainment features would be held in the ballroom each evening during the convention; that the other available rooms on the second floor would be used for meeting room purposes for the other affiliated associations, special committee meetings, etc., leaving the stage, and the two rooms on either side of the stage, as well as the entire arena floor, free for exhibition purposes, and that Monday afternoon and Wednesday morning of convention week had been set aside by the committee on subjects and meetings for exhibit inspection, during which periods there would be no meetings.

Upon motion of Mr. McCalla, seconded by Mr. Price, the report of the director of exhibits and the minutes of the special subcommittee meeting, held Feb. 4, were accepted and filed, and all of the recommendations contained in the report and in the minutes of the subcommittee meeting approved with the exception of the exhibit space layout and the classification of exhibits which were left for separate action.

The chairman then presented Plan "A" as approved by the special subcommittee appointed to layout floor plan and explained the layout in detail. After discussion upon motion of Mr. Cotsworth, seconded by Mr. McCalla, it was decided that Plan "A," as presented and explained, be approved and the chairman and director of exhibits were authorized to proceed with the preparation of detailed plans showing this space layout, of the necessary printed matter regulations, etc., to be sent out to exhibitors on April 12.

It was decided that all exhibits, with the exception of street cars to be shown on the Convention Hall Plaza, should be closed down at 6 p.m. each day, but that the auditorium should remain lighted so that a general view of the exhibits might be had from the balcony.

It was decided by the committee to recommend that meetings of the Transportation and Traffic Association, which are held in the afternoon, be held in some other room than the main ballroom so as to leave this room available for afternoon entertainments. Upon motion of Mr. Robinson, seconded by Mr. Bale, it was decided that the date of the next meeting of the committee should be tentatively set for May 16, at Atlantic City.

To Study Curing of Concrete Paving

The executive committee of the Highway Research Board, National Research Council announces the formation of a special committee to conduct an investigation of the problem of proper curing methods for concrete pavements. The work will consist largely in correlation of the research work being carried on by the Bureau of Public Roads and various state highway departments.

The committee is composed of Chairman F. C. Lang, University of Minnesota and Minnesota State Highway Department; E. F. Kelley, chief of the division of tests, U. S. Bureau of Public Roads, Washington, D. C.; W. A. Slater, research professor of engineering materials and director Fritz Engineering Laboratory, Lehigh University, Bethlehem, Pa.; F. V. Reagel, engineer of materials and tests, Missouri State Highway Department, Jefferson City, Mo.; Frederick E. Schnepfe, civil engineer, Washington, D. C.; H. F. Gonnerman, manager research laboratory, Portland Cement Association, Chicago, Ill.; Stanton Walker, director of engineering and research division, National Sand & Gravel Association, Washington, D. C.

The work of the investigation will be carried on by Fred Burggraf under the general direction of R. W. Crum, director of the board.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	Feb. 19, 1929
Metals—New York	
Copper electrolytic, cents per lb.	17.775
Copper wire, cents per lb.	19.875
Lead, cents per lb.	6.95
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	49.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	$4.375
Somerset mine run, f.o.b. mines, net tons.	1.875
Pittsburgh mine run, Pittsburgh, net tons.	1.80
Franklin, Ill., screenings, Chicago, net tons.	1.45
Central, Ill., screenings, Chicago, net tons.	0.975
Kansas screenings, Kansas City, net tons.	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.90
Weatherproof wire base, N. Y., cents per lb.	20.875
Cement, Chicago net prices, without bags.	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25
Turpentine (bbl. lots), N. Y., per gal.	.63

Spanish Improvements Progress

In line with a ten-year public works program for which Spain is spending some $600,000,000 for the development of her railways, roads, and hydro-electric power facilities, trains throughout the country are being speeded up and electrified.

Potential hydro-electric power of more than 3,000,000 hp. provides more than an adequate supply of electrical energy for home consumption, with possible long distance transmission to France and Portugal.

All kinds of machinery for the development projects—electric generators, lighting outfits, batteries, switches, electric motors, electric tools, power shovels, internal combustion engine, and various railway equipment, is being imported, and to large measures through American markets.

With an estimated national wealth of $31,000,000,000, Spain is increasingly interesting industrially and commercially.

TRADE NOTES

MARTINDALE ELECTRIC COMPANY, Cleveland, Ohio, has recently taken on national distribution of the Seneca Electric Arc Welder, manufactured by the Seneca Electric Welder Corporation, Seneca, Kan. This company has published a manual entitled: "Electric Arc Welding with Alternating Current." This book contains a number of profitable ways in which this process is being used and technical and practical operating information which will help users of Seneca Alternating Current Arc Welders. A copy of this manual will be mailed on request to those interested by addressing Martindale Electric Company.

THE WATSON-STILLMAN COMPANY, 75 West Street, New York, N. Y., manufacturer of hydraulic machinery, has appointed the Midvale Mining & Manufacturing Company as its representative in the St. Louis district. The Midvale Mining & Manufacturing Company has its main office at 705 Olive Street, St. Louis, Mo., and its warehouse at East St. Louis, Ill.

DELTA-STAR ELECTRIC COMPANY, Chicago, Ill., and the Monarch Electric Company, St. Johns, Quebec, Canada, have formed an association whereby the Canadian factory will now have full advantage of Delta-Star designs engineering and research facilities. A complete line of unit-type, standardized equipment will be produced at St. Johns for Canadian distribution.

ADVERTISING LITERATURE

NATIONAL CARBON COMPANY, New York, N. Y., through the co-operation of a number of representative wholesalers undertook the investigation and analysis of wholesalers' operating costs for the purpose of determining what should be the wholesaler's typical cost of distribution; how this cost may be apportioned among various products; what factors have a major influence on these costs. The work was undertaken with no preconceived ideas of what the results should be, nor was any special use to be made of the information gathered, other than to submit it to wholesalers for any value which it might have in assisting in the solving of their operating cost problems. The methods of combination and interpretation of statistics were studied and developed in what may be described as an engineering way so that as much as possible might be learned from the study. A report of this work has been published for distribution so that the results of this analysis, which definitely show why different products may entail widely varying handling costs and why the average cost of handling the whole line cannot be safely accepted in studying margins on any one line, may be used to help distributors curtail operating costs.



HORSE SENSE



Horses on street railways may be out of date, but horse-sense is still essential to their successful operation. This is especially true when it is a matter of selecting safety devices such as hand brakes.

And this undoubtedly accounts for the almost universal acceptance of

PEACOCK STAFFLESS BRAKES

For Peacock Staffless Brakes are sensible brakes, sensible from the standpoints of safety, maintenance, weight-saving, power and speed.

They are safe because they always function, in spite of slack rigging or worn brake shoes.

They are low in maintenance, because there are few parts to wear. Their light weight (only 72 lb.) is also an important consideration on modern cars.

And they are mighty powerful and fast. The average motorman can exert up to 3000 lb., and he can wind up the slack chain with exceptional speed.

In short, Peacock Staffless Brakes are the logical hand brakes for the sensible man to buy.

NATIONAL BRAKE COMPANY

890 Ellicott Square Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.
The Ellcon Co., General Sales Representative: 50 Church St., New York





H & K 900D Double Chair —a luxurious seat providing automotive comfort in a car and adaptable to either city or Inter-City service.

Today it's COMFORT you are selling

STREET car transportation is no longer merely a matter of moving passengers with reasonable safety and speed. It has become a *competitive* business—a job for salesmen who are able to attract more riders to your road. Comfort is undoubtedly a keynote of this competition and the comfort and arrangement of your car seats, therefore, play a most important part.

Hale & Kilburn seating engineers have considered both these factors. They have not only developed maximum comfort in seat *design* but provide for local traffic handling needs through the most comfortable *arrangement* of these seats. Their services, therefore, may be considered a direct aid to the sale of your service and the promotion of public relations.

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A better seat for every type of modern transportation service

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W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 146 N. Sixth St., Portland, Oregon
C. S. Wright Co., 66 Temperance St., Toronto, Ont., Canada

WRITTEN BY TRUCK OWNERS WHO HAVE USED THEM LONG ENOUGH TO KNOW

Mileage On One Tire Equal to a Trip Around the World and Four-fifths The Way Back

"You will no doubt be interested to know that just recently we removed a Goodrich Silvertown 30 x 5 Heavy Duty Casing, which gave 45,000 miles service, without being removed from rim."

James A. Malroney,
Supt. Motor Transportation
Tulsa Daily World,
Tulsa, Oklahoma.

◆ ◆

They Start and Stop Often Yet Average 26,000 Miles

"Our light trucks are subject to continual starting and stopping, such as in department store service. Naturally we selected the Silvertown Heavy Duty in preference to other makes. In this service our average is twenty-six thousand miles."

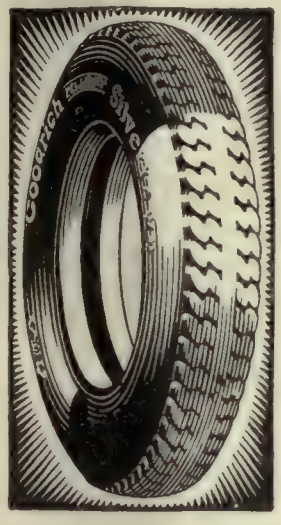
W. G. Davison, Pres.,
Davison Cartage Company,
Chicago, Ill.

◆ ◆

Equipped Exclusively . . . Because of Exceptional Mileage

"Our fleet of White busses has been equipped *exclusively* with Silvertown Heavy Duty Tires for the past 20 months. Besides being particularly free from the usual tire troubles experienced in bus service, we have secured what we believe to be *exceptional* mileage, some tires having delivered upwards of 60,000 miles."

Geo. H. Williams, Mgr.,
Seattle Renton Stage Line, Inc.,
Renton, Washington



Goodrich Heavy Duty Silvertown

The "water cured," weftless cord, twin beaded Silvertown Heavy Duty Cord Tire . . . for Trucks, Busses and Trailers.

◆ ◆

After testing other well known brands he intends to equip his Sight-seeing Busses 100% on Goodrich Silvertowns

"We are in the Sight-seeing business and our busses are subject to long runs which necessitate speed always loaded to capacity operating over very hilly roads. Our decision on Silvertowns was made after testing all the best known brands of tires. Goodrich give us complete satisfaction, so much so that we intend to equip 100% on Silvertown Heavy Duty Tires for 'Long Run' Service."

Frank Zirpolo, President,
The Newark Coach Co., Inc.
Newark, N. J.

For Large and Small Trucks . . . Local and Long Distance Hauling

"Our small, as well as our large, trucks are equipped with the Goodrich Tires in doing both local and long distance hauling of every description and at no time have they given us any trouble. We consider the Goodrich Tire a 100% tire."

William H. Hentschel, Vice Pres.,
Hentschel Bros., Inc., Brooklyn, N. Y.

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Their Entire Fleet Now Equipped with Goodrich Tires

"You may be interested to know that our entire fleet, consisting of 32 machines—trucks and roadsters—is now fully equipped with Goodrich Tires."

J. C. Ewing, Pres.,
City Coal Co., Inc., San Francisco, -

◆ ◆

Goodrich Silvertown Tires . . . The Foundation of Their Service

"For ten years, we have equipped our trucks with Goodrich Tires both Solid and Pneumatic Heavy Duty, as the foundation, upon which we have maintained our service."

Harold L. Gulick, Treasurer,
City Truck Co., Inc., Worcester, Mass.

◆ ◆

GOODRICH TIRES are used with satisfaction in every line of business . . . and on all types of motor trucks, busses and trailers. Specify the name "Goodrich" when you buy *new* trucks as well as when you buy *new* tires for old trucks.

Goodrich *Heavy Duty* Silvertowns

THE B. F. GOODRICH RUBBER COMPANY, *AKRON, OHIO*

Established 1870

Pacific Goodrich Rubber Co., Los Angeles, Cal. *In Canada:* **Canadian Goodrich Co., Kitchener, Ont.**

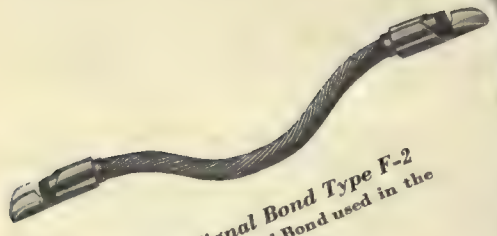
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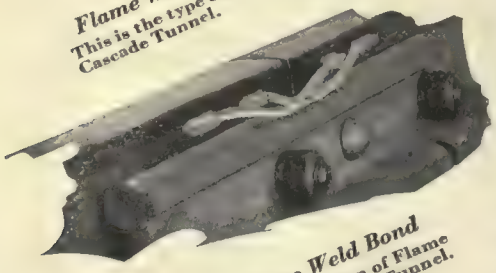
The American Steel and Wire Company wishes to tender a deserved tribute to the Great Northern Railroad and A. Guthrie and Company, contractors, on the successful completion of the Cascade Tunnel.

It was a tremendous project nobly conceived and ably executed, truly an epoch making achievement.

This Company naturally takes pride in the fact that its Flame Weld Bonds were used in the electrification of the tunnel, thus playing some part in this great forward step in transportation.



Flame Weld Signal Bond Type F-2
This is the type of Signal Bond used in the Cascade Tunnel.



Application of Flame Weld Bond
This shows the double application of Flame Weld Bonds used in the Cascade Tunnel.

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Subsidiary of United States Steel Corporation

Offices in—Boston, 208 So. LaSalle St., Chicago, 30 Church St., New York
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U. S. Steel Products Co.: San Francisco, Los Angeles, Portland, Salt Lake City,
Export Representative; 30 Church St., New York City, Seattle.



These Men Are in *Your* Employ

The men shown in the illustration are for all practical purposes working for *you*. It is *your* interests they are told to guard, *your* viewpoint they are asked to take. · · · · Their job is to examine the finished GARY WROUGHT STEEL WHEELS with eyes trained by long experience to detect even slight defects; to apply specially designed tools of micrometer accuracy; and to see to it that only the perfect product reaches the shipping dock. · · · · Another step in the journey that leads to multiplied mileage—another assurance of greater return for your wheel dollar. Our wheel engineers are at your command.

Illinois Steel Company
Subsidiary of United States Steel Corporation
General Offices: 208 South La Salle Street
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"Canned Experience"

Make use of the other man's experience

That old saying

about experience being the best teacher is absolutely sound in one sense. But most of us recite it without thinking that experience may be of various sorts—the experience of other men as well as our own, "canned experience," if you please, ready for use. Just open and serve yourself! Why not take advantage of the experience of other men as far as we can and save not only years of time but many expensive lessons?

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Electric Railway Handbook

A thoroughly revised reference book of practical data, formulas and tables for the use of operators, engineers and students. It gives the essential reference data on all phases of electric railway construction and operation. It presents: (1) Data on subjects which come up in everyday electric railway practice. (2) Material of service to the non-technical manager or operator. (3) Reference material on electric railway practice for those who are specializing in other or allied lines.

2

Harding—

Electric Railway Engineering

A thorough revision of this standard work on the theory and practice of electric railway engineering. The book covers the principles of train operation, power generation and distribution, equipment and types of systems.

3

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Linemans' Handbook

The first book written expressly for linemen, foremen, and other employees of line departments. The book meets the growing need for a pocket volume of construction and maintenance data, procedure, and methods. It presents hundreds of kinks, shortcuts, expedients and time- and work-saving methods, as well as scores of useful diagrams, tables, and formulas for the lineman.

4

Standard Handbook for Electrical Engineers

A widely-known encyclopedia of electrical engineering. The book covers every branch of modern electrical engineering. It is complete and reliable, and so carefully and fully indexed that its information is readily accessible.

5

Croft—

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The book is a reliable, useful handbook for wiremen, contractors, linemen, plant superintendents and construction engineers. It aims to give the practical man the facts on apparatus, materials and installation which he needs in his daily work. It is practical from cover to cover.

6

Blake and Jackson—

Electric Railway Transportation

A second edition of this widely known book on the transportation side of the electric railway business — getting the cars over the tracks — increasing the traffic — collecting the fares —and selling service in the face of modern conditions. Particular consideration is given to the place of the bus in modern transportation.



7

King—

Railway Signaling

A completely adequate book on all phases of modern railway signaling. The book describes fully the construction, installation, operation and maintenance of signaling equipment, and presents a thorough discussion of principles.

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This book presents the essential facts and the most mature views upon the underlying financial and economic phases of public utility companies, with particular emphasis on electric railways, electric light and power companies and gas companies.

It discusses every angle of the public utility *as a business* and treats thoroughly such subjects as capitalization, investment features, franchises, regulation, valuation, depreciation, taxes, rates, service, accounting methods, public relations, etc.

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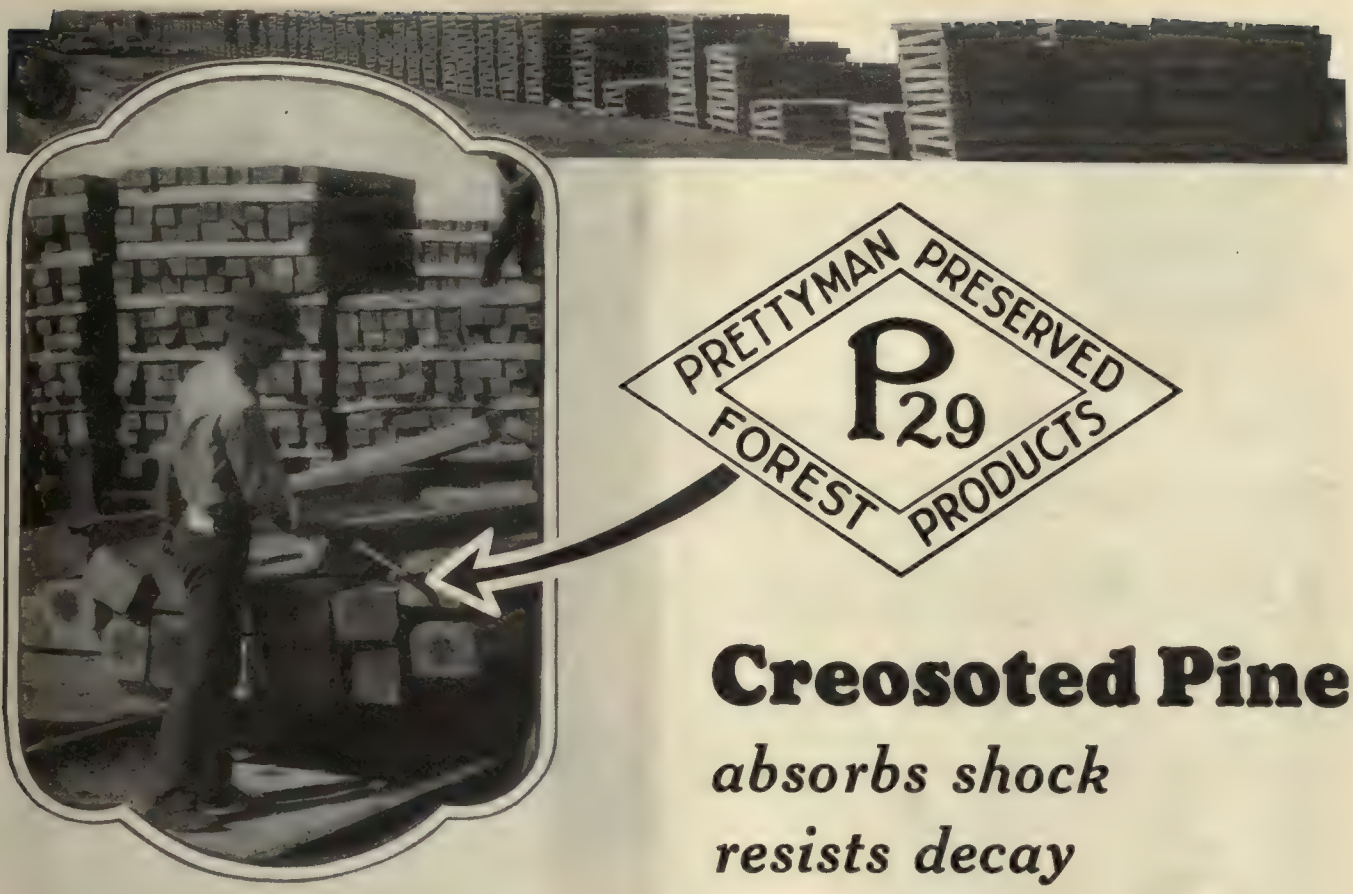
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PRETTYMAN PRESERVED
P29
FOREST PRODUCTS

Creosoted Pine

absorbs shock
resists decay
can't rust—costs less



Top view and insert show Prettyman Pine Ties on air seasoning yard and careful inspection and selection before treatment. Lower photo is of Prettyman Preserved Pine Ties in street railway tracks of South Carolina Power Company.

THERE CAN BE NO substitute for wooden ties where good will must be courted with smooth, comparatively silent riding comfort . . . where rolling stock, as well as human nerves, must be protected from noisy, jarring, destructive jolts of bumpy, unyielding tracks . . . where initial and annual costs are important considerations. Nothing else will do. ¶ Southern Yellow Pine is the most practical and economical of tie woods. Tough. Resiliently shock-absorbing. Highly adaptable to permanent preservation. ¶ Prettyman Preserved (impregnated to the heartwood with high grade creosote oil), it is impervious to the ravages of termites (white ants), decay-producing fungi and the deleterious effects of certain types of soils. Under rigorous railroad usage it lasts 15 to 25 years and more. ¶ Write today for quotations on your size in Prettyman Preserved Ties, either unframed or adzed and bored with precision machinery before treatment.

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The OHMER Type 80 Register

This is the type register which is earning the Birch Transportation Co., Inc. $200 a week. It publicly indicates the amount registered. It totalizes all money received. It prints a ticket and keeps a detailed record of each fare.

"Four *Type 80* Registers increase receipts $200.00 PER WEEK"

FROM the Birch Transportation Co., Inc. comes another story of tremendous savings effected through the use of OHMER Type 80 Registers. Mr. John J. Neauy writes:

"It may be of interest to you to know that the four Type 80 Registers which we purchased from you in August have caused our receipts to increase approximately $200.00 per week since before purchase.

"The registers have disclosed to us that they are capable of eliminating one of the most annoying sources of shrinkage that a transportation company may have."

What the OHMER Type 80 Register has done for the Birch Transportation Co., Inc. and other progressive transportation companies, it also will do for you. Install the Type 80 in every one of your cars and busses. Let it print your tickets . . . safeguard collections . . . simplify bookkeeping and auditing. Let it pay for itself . . . and then pay you.

Investigate this remarkable new register today. Write at once for more detailed information. Find out how it will reveal those secret losses . . . how it will pay big profits. This will not obligate you in any way.

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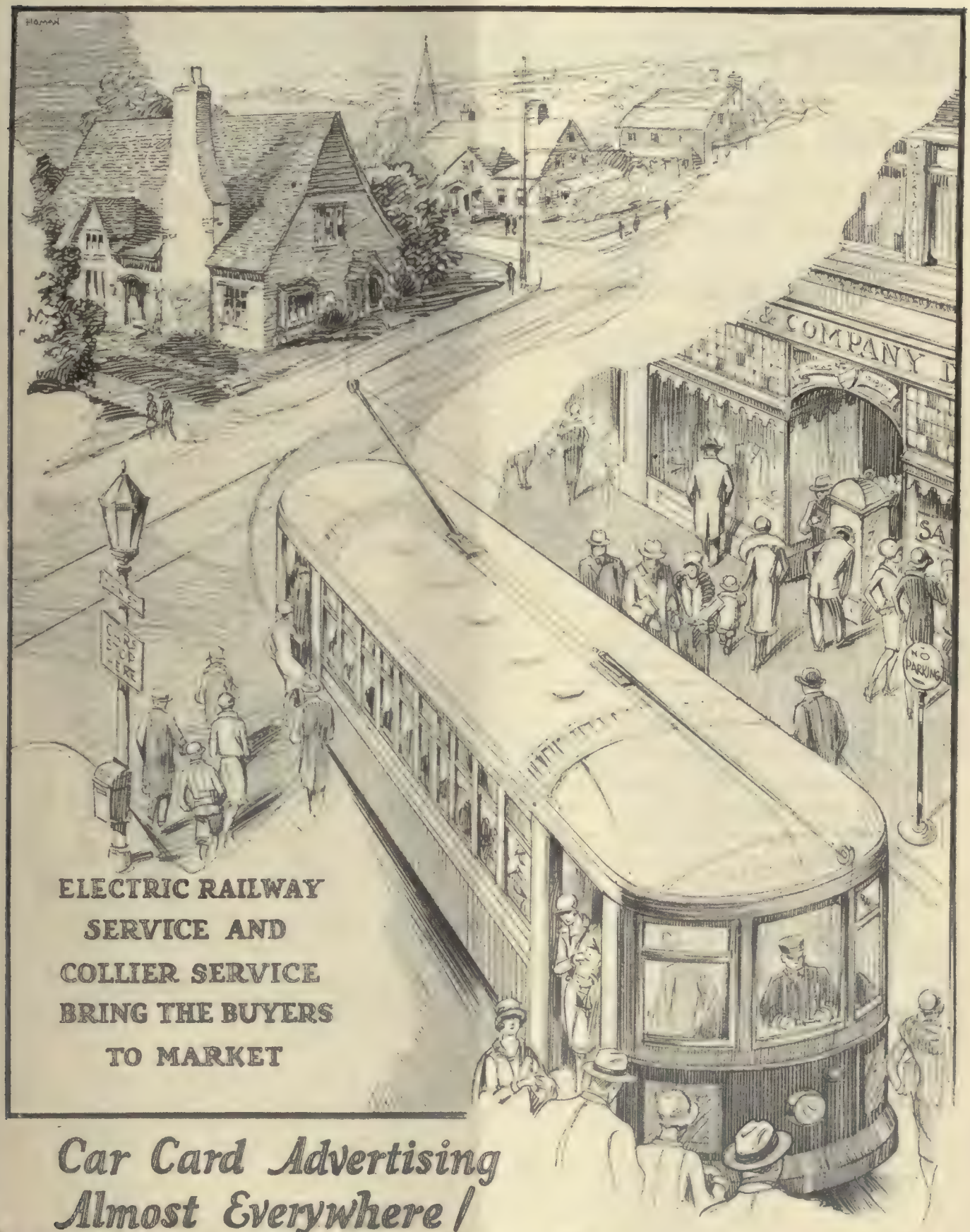


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Winter's icy storms bring no added hazard to the car equipped with **"Safkar"** Steps. Snow, ice or sleet will not make their surface slippery —snow will not build up in and on them. Not only are step accidents reduced, but traffic is speeded up because passengers feel the secure **"Safkar"** foothold.

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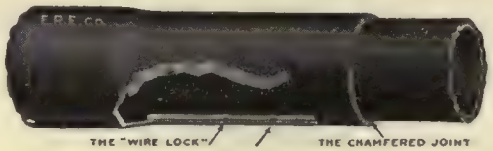
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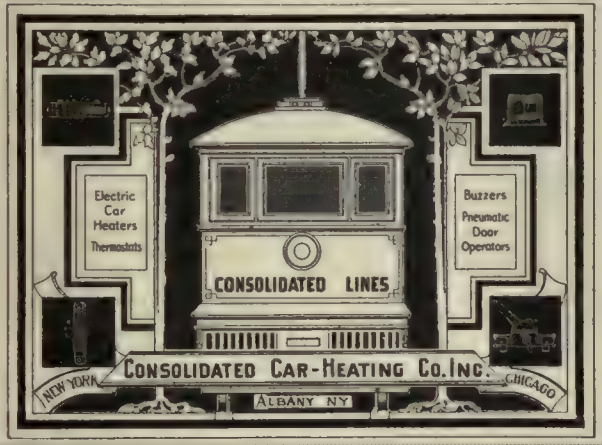


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Lowest Cost — Lightest Weight
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Standard on 60 Railways for

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Detroit	Kansas City	Los Angeles
Denver	Council Bluffs	Tacoma
Cleveland	Salt Lake City	Cincinnati



Johnson Electric Fare Boxes



and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 5000 already in use.

Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

B. A. HEGEMAN, Jr. President H. A. HEGEMAN, First Vice-Pres. and Treas
F. T. SARGENT, Secretary J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co.

Graybar Building, 420 Lexington Ave., New York

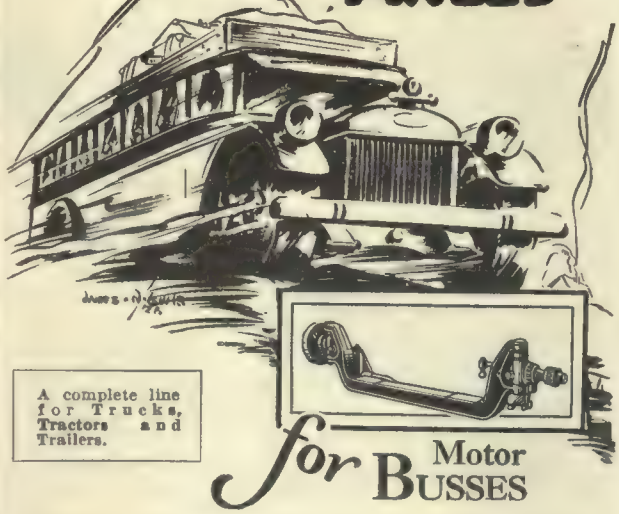
BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Calif.
Lister-Reese Inc., 401 S. Brand Blvd., Glendale, Calif.

RAILWAY SUPPLIES

Houdaille Shock Absorber.
Tool Steel Gears and Pinions
Anglo-American Varnish Co., Varnishes, Enamels, etc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Fighters
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mfg. Co., Springs
Bell Register Fare Boxes
Fraser Gas Electric Drive
Flaxlinum Insulation
Economy Electric Devices Co. Power Saving and Inspection Meters
National Safety Devices Company's Whistle Blowers. Gong Ringers and Brake Hangers
Godward Gas Generators
Cowdrey Automotive Brake Testing Machine
Tru-Drum Lathe

SHULER FRONT AXLES

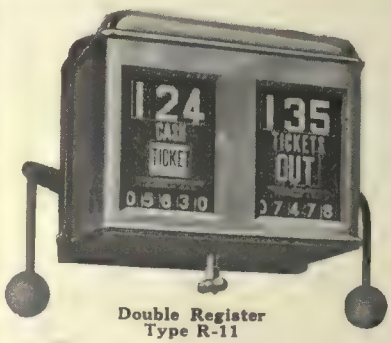


A complete line for Trucks, Tractors and Trailers.

for Motor BUSSES

SHULER AXLE COMPANY

Louisville Incorporated Kentucky



Double Register
Type R-11

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

The International Register Co.

15 South Throop Street, Chicago, Illinois

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

FOR SALE

200 International Fare Registers, Single Type R-10, Sheet Bronze Cases

These registers with B-10 horizontally operating backs and B-9 vertically operating backs are almost new. Most of them have been in service less than a year and none more than 2½ years. All are in first-class operating condition.

They are for sale because a change in rate of fare made it necessary to equip all I. R. C. cars and buses with a multi-fare register.

I. R. C. PURCHASING DEPARTMENT
1587 Michigan Avenue, Buffalo, N. Y.

Some One Wants To Buy

the rolling stock or equipment that you are not using.

Sell it

before depreciation scraps it.

Write for Advertising Rates

Searchlight Department

Tenth Ave. at 36th St., New York

POSITIONS VACANT

EXPERIENCED car barn foreman wanted; must have thorough knowledge of motors and all modern equipment and ability to handle employees. P-164, Electric Railway Journal, Tenth Ave. at 36th St., New York.

POSITIONS WANTED

ENGINEER—Ways and structures; 9 years' experience with street railway and interurban property. Clean, successful record, high-grade references, seeking position with future. PW-161, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, broad experience, established successful record city, interurban railways, buses. Will accept position of assistant with future. Salary and location secondary importance. Fine references. PW-162, Electric Railway Journal, Tenth Ave. at 36th St., New York.

OFFICIAL PROPOSAL

Bids: March 14.

Tracklaying Broad Street Subway

DEPARTMENT OF CITY TRANSIT, CITY OF PHILADELPHIA, 13TH FLOOR, CITY HALL ANNEX
Philadelphia, Pa., Feb. 20, 1929.

Sealed proposals, addressed to the undersigned, at the office above mentioned, will be received until 12 o'clock noon (Eastern Standard Time), on Thursday, March 14, 1929, and publicly opened immediately thereafter, for:

CONTRACT NO. 213—TRACKLAYING SOUTH STREET TO NORTH OF GIRARD AVENUE.

Specifications and plans may be seen at the office of the Department, on the 14th floor, City Hall Annex, and copies of same with blank forms for proposals, will be supplied to intending bidders upon application. A deposit of Fifty (50) dollars will be required for the specifications and plans. This deposit will be refunded upon return of the specifications and plans in good condition.

Bidders must be skilled and regularly engaged in the class of work for which they are competing.

No bid will be considered unless accompanied by a certified check on a responsible bank or trust company in favor of the City of Philadelphia, to the amount of five (5) per centum of the sum of such bid, in accordance with the provisions of an ordinance approved March 21, 1928, and reprinted in full in the specifications.

The Director reserves the right to reject any or all bids, as he may deem best for the interest of the City of Philadelphia.

C. E. MYERS, Director.

MANAGER

Experienced street railway man wanted on eastern property operating 75 cars. Must be familiar with all phases of street railway work and successful in public relations. Technical education desirable. Good opportunity for advancement. Apply giving details and references.

PV-163, Electric Railway Journal
Tenth Ave. at 36th St., New York City.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Tr. Br. Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Regulators, Voltage, Current & Synchronizing
American Brown Boveri Electric Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Illinois Steel Co.
Westinghouse E. & M. Co.

Axles, Front
Shuler Axle Co.

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
International Reg. Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings, Anti-Friction
Timken Roller Bearing Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co., A.

Bearings, Roller
Timken Roller Bearing Co.

Bearings, Thrust
Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Htg. Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Brill Co. The J. G.

Bolts, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Bolts and Nuts, Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Books
McGraw-Hill Book Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.

Brake Adjusters
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe & Found. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.

Brake Testers
National Ry. Appliance Co.

Brakes, Brake Systems and Brake Parts
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon
General Electric Co.
Westinghouse E. & M. Co.

Brushholders
Columbia Machine Works
General Electric Co.

Buses, Motor
General Electric Co.

Bus Lighting
National Ry. Appliance Co.

Bushings, Case Hardened and Manganese
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
General Electric Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.
Irving Iron Works

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Carbon Brushes (See Brushes, Carbon)

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

Castings, Brass Composition or Copper
Cincinnati Car Co.
Columbia Machine Works

Castings, Gray Iron and Steel
American Brake Shoe & Found. Corp.
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

Castings, Malleable & Brass
American Brake Shoe & Found. Corp.
Bemis Car Truck Co.
Columbia Machine Works
Timken Roller Bearing Co.

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Change Trays
Cincinnati Car Co.

Circuit Breakers
American Brown Boveri Electric Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Cleaners
Oakite Products, Inc.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.

Coil Banding and Winding Machines
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Coils, Coke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Changers
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Reg. Co., The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Works
Consolidated Car Htg. Co.
Elec. Service Supplies Co.

Controllers or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Brass Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Reg. Co., The
Roebling's Sons Co., John A.
Silver Lake Co.

Cord Connectors and Couplers
Elec. Service Supplies Co.

Couplers Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols-Lintern Co.

Cranes, Hoists & Lifts
Electric Service Supplies Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Tr. Br. Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Works
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.

Doors, Folding Vestibule
National Pneumatic Co.

Doors & Door Fixtures
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.

Drum Truing Lathes
Nat'l Rlwy. Appliance Co.

Dryers, Sand
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electrical Wires and Cables
American Steel & Wire Co.
John A. Roebling's Sons Co.

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Beeler, John A.
Bibbins, Roland J.
Buchanan & Layng Corp.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Rlwy. Appliance Co.
Ohmer Fare Register Co.
Perey Mfg. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Floodlights
Electric Service Supplies Co.
General Electric Co.

Flooring, Fireproof
Irving Iron Works

Flooring, Open Steel
Irving Iron Works

Flooring, Non-Slipping
Irving Iron Works

Flooring, Steel, Subway
Irving Iron Works

Flooring, Ventilating
Irving Iron Works

Forgings
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Furnaces, Electric
American Brown Boveri Electric Co.

(Continued on page 36)

LORAIN

Girder Rails, Special Trackwork, Switches, Frogs and Crossings in Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail

The Lorain Steel Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

General Offices: Johnstown, Pennsylvania

Sales Offices:

Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh

Pacific Coast Distributors: United States Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
Export Distributors: United States Steel Products Co., New York

COLUMBIA

Railway and Utility Supplies

Castings—Grey Iron, Brass and Aluminum

Forgings
Special Machinery and Patterns

Machine and Sheet Metal Work

Armature and Field Coils.

The Columbia Machine Works *and M. I. Co.*
265 Chestnut St., corner Atlantic Ave.,
Brooklyn, New York

"Good maintenance is absolutely essential to good service . . ."

SO writes Adrian Hughes, Jr. in the *Electric Railway Journal*, January 5th issue. He states, in development of this topic, that the satisfactory appearance of buses can best be maintained by a daily bath.

For regular cleaning of buses, Oakite materials are particularly effective. With unusual speed and thoroughness, Oakite cleaning gets all the traffic dirt and grime. Keeps paintwork film-free and brilliant without laborious scrubbing and scraping.

Ask our nearest Service Man how Oakite methods make quicker, better cleaning possible in bus and car shops. Write or 'phone and he will call. No obligation.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

OAKITE

TRADE MARK REG. U. S. PAT. OFF.

Industrial Cleaning Materials and Methods

Fuses and Fuse Boxes
Columbia Machine Works
Consolidated Car Htg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gas Electric Drive for Buses
General Electric Co.
Nat'l Rlwy. Appliance Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co. The J. G.
Cincinnati Car Co.

Gear Blanks
Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Columbia Machine Works
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.

Generators
American Brown Boveri Electric Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grating, Steel Subway
Irving Iron Works

Grinders & Grinding Supplies
Metal & Thermit Corp.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Guard Rail Clamps
Lorain Steel Co.
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Service Supplies Co.

Harps, Trolley
Columbia Machine Works
Elec. Service Supplies Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.

Headlining
Columbia Machine Works

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Htg. & Lght. Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car Stove
Smith Heater Co., Peter

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Works

Hose, Pneumatic
Westinghouse Tr. Brake Co.

Instruments, Measuring, Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co
General Electric Co.
Westinghouse E. & M. Co.

Jacks (See also Cranes, Hoists and Lifts)
Columbia Machine Works
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Lamp Guards and Fixtures
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Cincinnati Car Co.

Lighting Fixtures, Interior
Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Diesel Electric
American Brown Boveri Electric Co.

Locomotives, Electric
American Brown Boveri Electric Co.
Cincinnati Car Co.
General Electric Co.
Westinghouse E. & M. Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr.. & Co.

Manganese Steel Castings
Bemis Car Truck Co.
Lorain Steel Co.

Manganese, Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.

Manganese Steel Switches Frogs and Crossings
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Mirrors, Inside & Outside
Cincinnati Car Co.

Motor Buses, (See Buses)

Motor & Generator Sets
American Brown Boveri Electric Co.

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Motors, Generators and Controls for Electric Buses
General Electric Co.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.

Nuts and Bolts
American Steel Foundries
Bemis Car Truck Co.
Cincinnati Car Co.

Omnibuses (See Buses)

Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Tr. Brake Co.

Paints and Varnishes (Insulating
Elec. Service Supplies Co

Paints & Varnishes, Railway
National Ry. Appliance Co.

Paving Material
American Brake Shoe & Found. Corp.

Pickup, Trolley Wire
Elec. Service Supplies Co.

Pinion Pullers
Elec. Service Supplies Co.

Pinions (See Gears)

Pins, Case Hardened
American Steel Foundries
Bemis Car Truck Co.

Pins, Case Hardened, Wood and Iron
American Steel Foundries
Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Works
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Supplies Co.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Union Metal Mfg. Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber & Pole Co.
Intern. Creos. & Const. Co.
Prettyman & Sons, J. F.

Poles and Ties, Treated
Bell Lumber & Pole Co.
Intern. Creos. & Const. Co.

Poles, Trolley
Elec. Service Supplies Co.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Portable Grinders
Railway Trackwork Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Saving Devices
National Ry. Appliance Co

Pressings, Special Steel
Cincinnati Car Co.

Pressure, Regulators
General Electric Co.
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Consolidated Car Htg. Co.
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Rheostats
General Electric Co.
Westinghouse E. & M. Co.

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Brill Co., The J. G.
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Nichols-Lintern Co.

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Switch Stands and Fixtures
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American Brown Boveri Electric Corp.
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Switches, Selector
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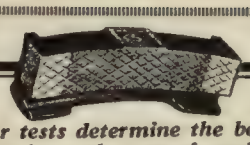
Switches, Track (See Track Special Work

Tampers, Tie
Railway Trackwork Co.

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Tee Rail Special Track Work
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(Continued on page 38)



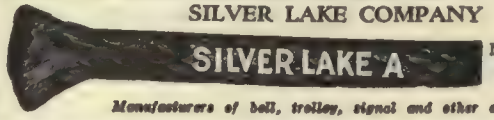
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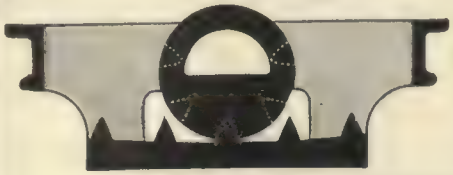
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ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Page

—A—

American Brake Shoe & Foundry Co. 37
American Brass Co. The..... 37
American Brown Boveri Electric Corp. 16
American Car Co.....Third Cover
American Steel Foundries 6
American Steel & Wire Co..... 24
American Telephone & Telegraph Co. 5
Anaconda Copper Mining Co... 37

—B—

Beeler Organization 30
Bell Lumber & Pole Co..... 37
Bemis Car Truck Co..... 31
Bethlehem Steel Co..... 31
Bibbins, J. Rowland 30
Brill Co., The J. G.....Third Cover
Buchanan & Layng Corp..... 30

—C—

Cleveland Fare Box Co..... 31
Collier, Inc., Barron G..... 29
Columbia Machine Works..... 35
Consolidated Car Heating Co.. 31

—D—

Differential Steel Car Co., The.. 31

—E—

Electric Ry. Equipment Co.... 31
Electric Service Supplies Co... 7

—F—

Faile & Co., E. H..... 30
Ford, Bacon & Davis..... 30
"For Sale" Ads..... 33

Page

—G—

General Electric Co. 19, 20 and Back Cover
Globe Ticket Co..... 15
Gold Car Htg. & Ltg. Co..Insert 11
Goodrich Rubber Co., The B. F. 23
Griffin Wheel Co..... 32

—H—

Hale-Kilburn Co. 22
"Help Wanted" Ads..... 33
Hemphill & Wells 30
Holst, Englehardt W..... 30

—I—

Illinois Steel Tie Co..... 25
International Creosoting & Construction Co. 14
International Register Co., The. 32
International Steel Tie Co.....8, 9
Irving Iron Works..... 28

—J—

Jackson, Walter 30
Johnson Fare Box Co..... 32

—K—

Kelker, DeLeuw & Co..... 30
Kuhlman Car Co.....Third Cover

—L—

Lorain Steel Co..... 35

—M—

Master Plier Corp..... 37
McClellan & Junkersfeld 30

Page

McGraw-Hill Book Co. 26
Metal & Thermit Corp..... 18

—N—

Nachod and U. S. Signal Co.... 37
National Brake Co., Inc..... 21
National Pneumatic Co..... 13
National Ry. Appliance Co.... 32
Nichols Lintern Co..... 37

—O—

Oakite Products, Inc..... 35
Ohmer Fare Register Co..... 28
Okonite-Callender Cable Company, Inc., The..... 31
Okonite Co., The..... 31

—P—

Perey Mfg. Co., Inc..... 37
Positions Wanted and Vacant.. 33
Prettyman & Sons, J. F..... 27

—R—

Rail Joint Co..... 37
Railway Track-work Co..... 4
Railway Utility Co..... 37
Ramapo Ajax Corp..... 37
Richey, Albert 30
Roebling's Sons Co., John A... 37

—S—

Sanderson & Porter 30
Searchlight Section 33
Shuler Axle Co..... 32
Silver Lake Co..... 37
Smith Heater Co., Peter..... 37

Page

Standard Steel Works Co..... 17
Star Brass Works..... 32
Stevens & Wood, Inc..... 30
Stone & Webster 30
Stucki Co. 37

—T—

Timken Roller Bearing Co., Back Cover

—U—

Una Welding & Bonding Co... 37
Union Metal Mfg. Co....Insert 12

—W—

"Want" Ads 33
Wason Mfg. Corp.....Third Cover
Westinghouse Elec. & Mfg. Co., Second Cover
Westinghouse Traction Brake Co. 10
Wharton, Jr. & Co., Inc., Wm.. 31
"What and Where to Buy." 34, 36, 38
White Eng. Corp., The J. G... 30
Wish Service, The P. Edw..... 30

SEARCHLIGHT SECTION

Classified Advertising

Classification Page

BUSINESS OPP. 33
EMPLOYMENT 33
USED AND SURPLUS EQUIPMENT 33
Erie Railways Co..... 33

WHAT AND WHERE TO BUY—Continued from page 36

Telephones and Parts
Elec. Service Supplies Co.

Telephone & Telegraph Wire
American Steel & Wire Co.
American Tel. & Tel. Co.
John A. Roeblings Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.)

Thermostats
Consolidated Car Htg. Co.
Gold Car Htg. & Lght. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Tickets and Transfers
Globe Ticket Co.

Tie Plates
Illinois Steel Co.

Ties & Tie Rods, Steel
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
Goodrich Rubber Co.

Tokens
Johnson Fare Box Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

Tools, Track, Line & Miscellaneous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Master Plier Corp.
Railway Trackwork Co.
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Towers and Transmission Structure
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Track Grinders
Metal & Thermit Corp.
Railway Trackwak Co.
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Track, Special Work
Columbia Machine Works
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Trackless Trolley Cars
Brill Co., The J. G.

Transfer Issuing Machines
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Transformers
American Brown Boveri Electric Corp.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety Stair, Car Step
Cincinnati Car Co.
Irving Iron Works

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Okonite Co.
Okonite-Callender Cable Co.

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

Trolley Wheel Bushings
Star Brass Works

Trolley Wheels (See Wheels Trolley)

Trolley Wire
American Brass Co.
American Steel and Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
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Tubing, Steel
Timken Roller Bearing Co.

Turbines, Steam
American Brown Boveri Electric Corp.
General Electric Co.
Westinghouse E. & M. Co.

Turntables
Elec. Service Supplies Co.

Turnstiles
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Perey Mfg. Co., Inc.

Valves
Westinghouse Tr. Br. Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Htg. Co.
Nichols-Lintern Co.
Nat'l Ry. Appliance Co.
Railway Utility Co.

Welded Rail Joints
Metal & Thermit Corp.
Railway Trackwork Co.
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Welders, Portable Electric
General Electric Co.
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Westinghouse E. & M. Co.

Welders, Rail Joint
General Electric Co.
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Welding Processes and Apparatus
Metal & Thermit Corp.
Railway Trackwork Co.
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Westinghouse E. & M. Co.

Welding, Steel
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Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
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American Steel Foundries
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